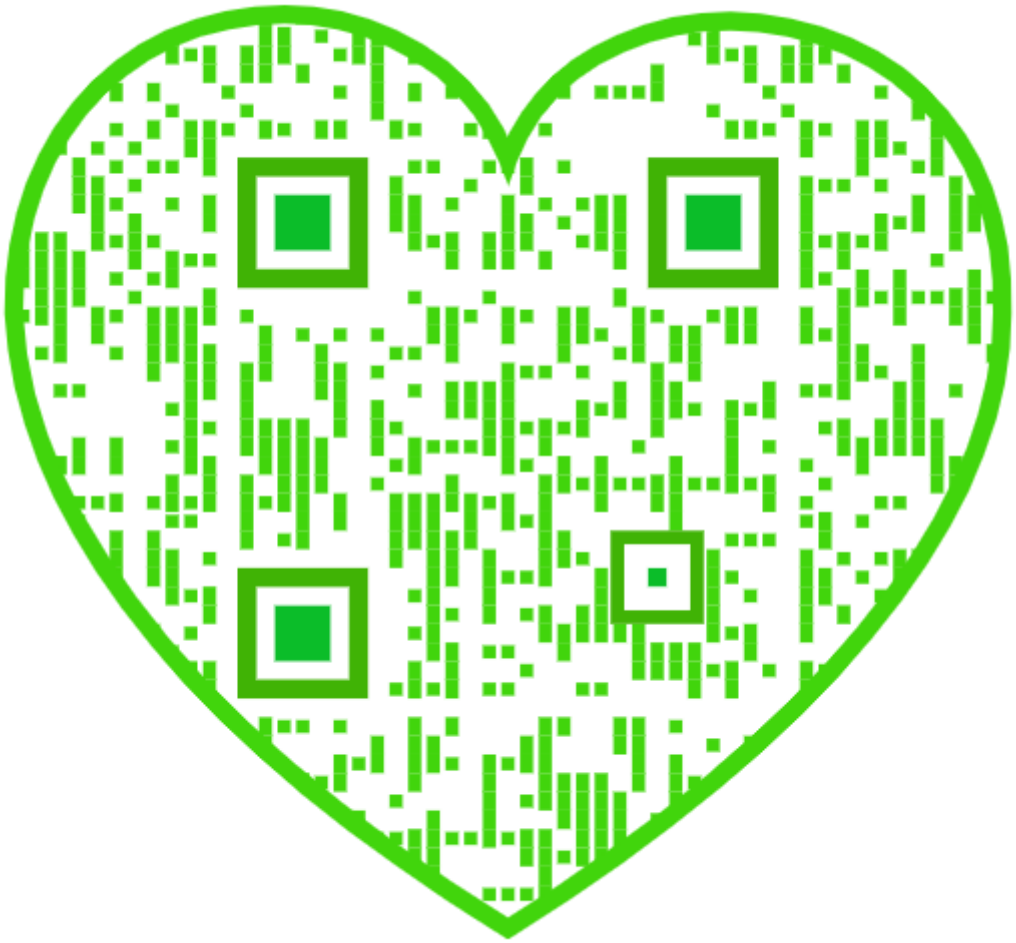


A RUSSIAN PRINCESS NURSE.

Type Russian Red Cross nurse.

# REPORT

ON THE

# RUSSIAN MEDICAL AND SANITARY FEATURES OF THE RUSSO-JAPANESE WAR TO THE SURGEON-GENERAL, U. S. NAVY

BY

SURGEON RAYMOND SPEAR
U. S. NAVY

---

Washington, July 1, 1906

---

WASHINGTON
GOVERNMENT PRINTING OFFICE
1906

LANE LIBRARY

L974
S74
1906

# CONTENTS.


| | Page. |
|---|---|
| Russian medical corps | 5–9 |
| Veterinary department, Russian army | 9–10 |
| Army hospital corps | 10–11 |
| Female nurses | 11 |
| Field organization | 12 |
| Russian Red Cross | 12–16 |
| Provisions for care of sick and wounded | 16–18 |
| Climatic and army sanitary conditions in Manchuria | 18–24 |
| Medical organization in army; equipment, transportation, etc | 24–30 |
| Cases in field hospital No. 44, July, 1905 | 30–34 |
| Discipline of field hospitals | 34–36 |
| Red Cross hospital trains | 36–42 |
| Movable railroad hospitals | 42–52 |
| The Kraesto Vosedrishensky movable hospital; equipment, cases, etc | |
| The St. Eugenie movable hospital | |
| Description of military hospitals, cases seen, etc | |
| Military bacteriological laboratories: | |
| Serum therapy | 52–53 |
| Parasitology | |
| Care of insane | 53 |
| The Liban Red Cross hospital | 54 |
| German Red Cross hospitals | 54–56 |
| Use of hospital barges on rivers | 56–57 |
| Description of convalescent camps | 57–59 |
| The Kauffman Red Cross hospital | 58 |
| Health reports of army: | |
| General health conditions | 59–71 |
| Prevailing diseases | |
| Gunshot, shell, and other wounds | |
| Disposition of the dead | 71 |
| Artificial limbs | 71 |
| Pensions | 71–72 |
| Medical organization of the navy | 72–73 |
| Description of naval hospitals | 73–77 |
| Ship conditions during battle | 77–82 |
| Hospital ships | 82–83 |




70227

# MEDICAL REPORT ON THE RUSSO-JAPANESE WAR.

BY SURGEON RAYMOND SPEAR, U. S. NAVY.

U. S. S. BALTIMORE,
*Cavite, P. I., April 1, 1906.*

SIR: I have the honor to submit the following report:

When the Russian-Japanese war started, on February 8, 1903, the Russians were caught totally unprepared for an immediate conflict in the Far East. In all of Manchuria and the region about Vladivostok there were, exclusive of the garrison at Port Arthur, but 60,000 Russian soldiers (Statistical officer, Harbin).

Manchuria is connected with Russia proper by the trans-Siberian Railroad, for the most part through Siberia a single-track road, and is about 5,000 miles from St. Petersburg. The usual length of time the troops occupied in making the trip from Russia to the scene of war was in the neighborhood of thirty-five days.

The problem of transporting an army sufficient in size and equipment to cope with that of the Japanese, which was practically on the spot, was, indeed, a most difficult one. How well this was done is now well known. When peace was ratified, there were, east of Lake Baikal, 1,132,700 Russian soldiers. In the advanced positions immediately in front of the Japanese lines 729,000 men were intrenched in strong positions.

To recruit this enormous army, to keep and look after its health and sanitation, to provide means of transportation for the sick and wounded, to provide for their care and treatment, were the problems that confronted the medical department of the army.

## RUSSIAN MEDICAL CORPS.

In Russia doctors are subject to orders from the Government, as well as all other individuals, so the supply of doctors for the increase in the army was easily obtained from the civil practitioners. These physicians were simply notified to be ready to leave for whatever destination they were intended on a certain day. The best medical men in Russia were thus at the disposal of the Government. The need for "reserve doctors" for the army was so great that many towns and cities throughout Russia were left with a very scant supply of medical attendants. The Russian doctors are very well educated. They are required to take a course in medicine for five and one-half years before they receive their diplomas. The course is thorough, and is modeled on the medical courses in the German universities. In addition to the Military Medical School in St. Petersburg, where the regular medical officers of the army receive their degrees, in St. Petersburg, Moscow, Kieve, Odessa, Dorport, and Tomsk, in Siberia, there are large and up-to-date medical schools. The Russian medicine is practically the same as ours. Prescriptions are written in Latin, and the metric system is used.

It is very rare to meet a Russian doctor who does not speak and read German or French fluently. Many of them speak both languages, and not a few can read and speak English. A great many of the medical corps of the army have taken post-graduate courses in Berlin, Vienna, or Paris.

Many of the reserve doctors were men of prominence in their respective specialties in their native cities, and when in civil practice had charge of large clinics in the hospitals to which they were attached. These men were doing duty in the field, and doing it well. Men who had been eye and ear specialists, or men who had taken up other specialties, were detailed for duty in their own special lines when possible; but this manner of distributing duty was not always practicable. Surgeons, however—that is, men who had been doing good surgical work at home—were given duty where their services were apt to be of most value.

The medical officers in the Russian army do not have distinct military rank, as do the doctors in our Army, and most continental armies. In its stead they advance by different orders of the civil or "chin" rank.

All public servants—all men who occupy any position in any way connected with the Government, and the Government in Russia predominates everything—belong to one or the other of the civil or "chin" ranks, and they were the uniform of their grade. If a man is transferred from one government position to another he always carries his civil or "chin" rank with him. So a "chin" rank is, to say the least, not a very select one. The medical men in the army feel that they should be given actual rank and more privileges.

The "chin" rank embraces twelve degrees, as follows:

(1) Collegian registrar (noncommissioned officers in Palace Guards).
(2) Provincial secretary (second lieutenant).
(3) County secretary (first lieutenant).
(4) Collegian secretary (staff captain).
(5) Titular-rath (captain).
(6) Collegian assessor (major).
(7) Hof-rath, or court councillor (lieutenant-colonel).
(8) Collegian-rath (above lieutenant-colonel).
(9) Staats-rath (colonel).
(10) Wirklicher Staats-rath (major-general).
(11) Geheim-rath (lieutenant-general).
(12) Wirklicher Geheimer Staats-rath (general).

Doctors enter the military service with the "chin" rank of Titular-rath, or captain. After serving three years in the regular service they are promoted to the rank of major; the next grade, of lieutenant-colonel, is usually attained in two years, and four years later, if service has been satisfactory, the assimilated rank of colonel is reached. The four highest grades are filled by the selection and approval of the Czar. Medical men, after the entrance examinations, are not examined professionally for promotion. Most of the reserve doctors on entrance were given the comparative rank of captain. All the reserve doctors, however, who had civil rank before entering the army wore the uniform of their respective grades, and each man was given a position in keeping with his rank, but usually subordinate to one of the regular military doctors.

The medical department of the Russian army is organized on broad lines and is patterned after the medical corps of the German army, from which it differs, however, in introducing line officers into its make up. These line officers occupy positions that should be filled by medical men. For instance, on General Linevitch's staff General Ivanhov was at the head of the sanitary department. General Ivanhov was a cavalry officer before he received his appointment on the staff of the commander in chief. Just why a cavalry officer should be chosen to supervise the medical department of an army is hard to understand. He occupied a position in which he could have inflicted a great deal of harm. Fortunately he was on good terms with his medical advisers, and followed their advice on most subjects—in fact, he was merely a nominal head. Certainly if the chief medical officer of the army were on the general's staff, the medical organization of the army would be stronger—would be on a better footing—and consequently more efficient.

Russia is divided into the following military districts: Finland, Moscow, Odessa, Karsan, Turkestan, Pre Amour (Vladivostok), Three armies in the field, St. Petersburg, Kieve, Warsaw, Caucasia, Omsk, in Siberia and Harbin (army of the rear).

Each district has its distinct army organization, with a general in command. On each general's staff a line officer is at the head of the medical department. Under him is a medical inspector-general and his staff.

Line officers are also placed in command of hospital trains and general hospitals. At one time they were in command of field hospitals; but war conditions necessitated putting the senior medical officer in command.

At the head of the army medical department, corresponding to the Surgeon-General of our Army, is Medical Inspector-General Sperinski, who has a relative rank of "general," and is directly under the minister of war. He is an excellent man, is gifted with marked executive ability, and is liked by all his subordinates. Under his supervision are the component parts of the medical organization of the different armies, the medical supply storehouses, sanitary transports, and the vast hospital system.

On September 2, 1905, the following table embraced the medical personnel of the Russian army east of Lake Baikal, exclusive of the Red Cross organization:

| | Medical personnel.[a] | | | Apothecaries. | | |
|---|---|---|---|---|---|---|
| | Regular medical officers. | Reserve medical officers. | Total. | Regular service. | Reserve service. | Total. |
| Present | 855 | 1,743 | 2,598 | 78 | 128 | 206 |
| On furlough | 6 | 12 | 18 | ..... | 1 | 1 |
| Evacuated | 52 | 151 | 203 | 3 | ..... | 3 |
| Lost | 1 | 3 | 4 | ..... | ..... | ..... |
| Sick in hospital | 23 | 66 | 89 | 1 | 1 | 2 |
| Arrived | 39 | 19 | 58 | ..... | ..... | ..... |
| On duty | 812 | 1,530 | 2,342 | 74 | 126 | 200 |

[a] The authorized medical personnel is 2,789.

Making a total of 2,360 doctors and 201 apothecaries.

The sanitary organization of the army in the field consists of 6 divisions, as follows:

(1) Medical department. (The medical inspector is the immediate chief and has to do with the medical officers, medical supplies, and sanitation.)

(2) The hospital department. (Usually a colonel of the line is the immediate chief.)

(3) Locating, constructing, and repairing of hospital department. (A line officer, usually a colonel, is at the head.)

(4) Evacuation department. (A line officer, a colonel of the general staff, is at the head.)

(5) Statistical office. (Chief medical statistical officer, usually a colonel, at the head.)

(6) Veterinary department. (A veterinary inspector in charge.)

Medical Inspector-General Gabasevitch was the chief medical officer of the army. He had the assignment of the medical personnel up to and including division surgeons, but medical officers above that grade were assigned by higher powers. He inspected the hospitals, the personnel of the medical corps, directed, if necessary, the supply of surgical and medical materials, and informed the general in command of the health and sanitary conditions of the army. The food, clothing, and habitations of the soldiers were subject to his inspection and official criticism. The soldier's food, clothing, and habitations were inspected by him, and he issued many sanitary orders through the commander in chief in regard to these and also orders in regard to camp hygiene, such as the placing of sinks, closets, washing regulations for the men, etc.

The hospital and the locating, constructing, and repairing of hospital departments were in charge of line officers. Medical officers were made use of for advice, but that is all.

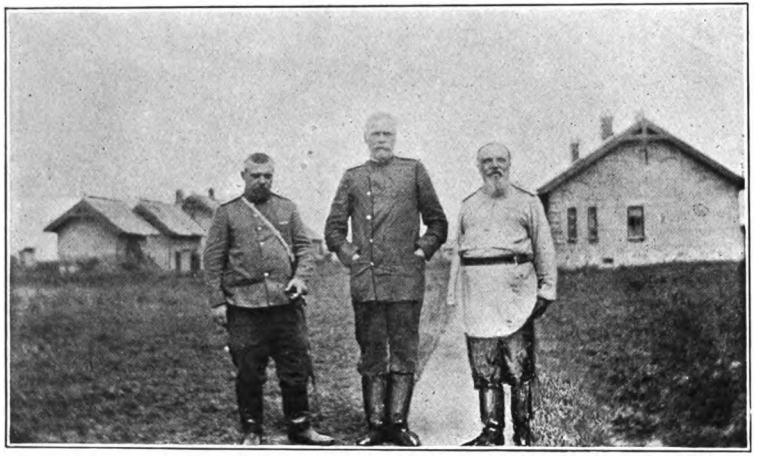
The evacuating department had to do with sending the sick and wounded to the various hospitals and returning convalescents to their posts of duty. At each evacuation depot there was a commission, as it was called. It usually consisted of 5 line and 5 medical officers, with a colonel of the line at the head.

In Harbin was situated the statistical office, under the charge of Doctor Kosloskay, who has the relative rank of a colonel. On his staff were 5 medical officers, 5 feldshers, 4 civilian clerks, and 2 typewriters.

In addition to these there were 2 medical officers with each of the 4 armies in the field.

Each week all the medical statistics were compiled in this office and reports sent to the commander in chief, who telegraphed them to the Czar. Twice in every month the medical reports were mailed to the medical director-general in St. Petersburg.

It was found that the inexperienced reserve doctors made many mistakes in their reports. To rectify this state of affairs 4 regular medical officers were detailed with each army to keep the statistics straight. The work of this office was well done. By the time peace had been officially signed, the records of the sick, wounded, the number of men that were transferred to the hospitals, returned to duty, the number of cases of the different diseases, typhoid and dysentery charts,



MEDICAL INSPECTOR GABASEVITCH AND ASSISTANTS.

showing where the cases had originated, and the numbers on definite dates had all been completed.

The veterinary department was distinct from the medical department, but came under the chief of the sanitary department. It had its own organization and was similar to that of the regular medical service. The veterinary doctors go by regular promotion to high grades. Their duties embrace the care and treatment of the horses and cattle. The following, which was obtained from the veterinary inspector-general of the army of the rear, in Harbin, explains the work of this branch of the service.

### The Veterinary Department of the Russian Army in Manchuria during the Russo-Japanese War.

In no single European war has such a serious problem been presented to the veterinary department as that which confronts the veterinary department in Manchuria in connection with the prevention of anthrax among the enormous number of horses in the army brought from Russia. Anthrax in Manchuria, in the absence of veterinary measures of any kind, is endemic, and appears in horses in an intestinal form with a mortality of between 50 per cent and 80 per cent. Infection is from food or from ground when latter is fouled by horses picketed thereon. In their struggle with this disease the Russian veterinary surgeons have been completely victorious, owing to preventive inoculation with anthrax vaccine of the Kazan professor, Lange. The peculiarities of this vaccine are priceless; by it calvary, artillery, and transport horses have been inoculated on the positions without in any way interfering with the military operations, since horses were put to work immediately after inoculation. Thanks to this vaccine, there was no instance in which anthrax appeared in a virulent form.

Another illness to which horses are liable in Manchuria is glanders, which attains terrific proportions amongst horses of local population. It was combatted by usual antiglanders measures, the first and foremost being constant examination and immediate isolation and destruction of suspected cases. The loss from glanders of horses brought from Russia will probably turn out to be less than one in one thousand. "Sura" and other virulent diseases were not observed.

#### FEEDING OF ARMY HORSES.

Food for horses has consisted of oats, barley, kaoliang, beans, bean cake, and maize, hay, "chumiza" straw, kaoliang straw, and even kaoliang stalks. None of these articles of food produced any fatal illness amongst the horses, with the exception of some isolated cases of "Mykotis sepsis intestinalis" (inflammation of stomach and intestines), due to musty food.

In addition to preventive measures against fatal diseases among horses in the army, the military veterinary service had to meet the not less serious problem of the protection of horned cattle from pest (pestis bovum). This most infectious disease is endemic in Manchuria. The usual preventive measures, supplemented even by destruction of cattle, would have been of little use. The destruction of cattle, as in Europe and European Russia, would have been an impracticable proceeding in the case of cattle obtained for the use of the army, because this might have amounted in extreme cases to the destruction of two-thirds of all the cattle driven out to the positions, and, consequently, two-thirds of the army might have been without meat. But here the Russian veterinary department had in its hands a most powerful weapon, to fully appreciate which now is hardly possible. We refer to the antipest serum prepared at Chita Station and at Iro, near Troitskosavsk. The action of this serum may be said, without exaggeration, to be magical. A herd of horned cattle inoculated with it is safe from the disease and runs no danger from any locality infected therewith. This serum rendered it possible, during the whole course of the war, to insure the meat supply of the army and at the same time to have that supplied fresh; it may boldly be said that, thanks to it alone, the army has been able to get on without tinned meat, about which so much was written in the press at the commencement of the war, when it was thought that America would have to be drawn upon. In this war the antipest serum has decided the question once for all, that in the future the Russian army may dispense with preserved meat if each unit is provided with a sufficient number of horned cattle inoculated with the serum, for only horned cattle are really susceptible to pest. All other diseases, such as "apthæ epizooticæ," fatal inflammation of the lungs (pleuro-pneumonia bovum contagiosa), and others, are not really dangerous to such cattle.

| | |
|---|---|
| Horses received by the army from Russia from January 14, 1904, to August 14, 1905 | 225, 8 |
| Of these, deduct, on account of illness | 5 |
| Horned cattle received | 150, 4 |
| Of these, there were lost from pest | 1, 0 |
| Sheep received by army via Harbin | 100, 6 |

STATSKI SOVIETNIK DOBROTVORSKI,
*Veterinary Inspector Rear of Manchurian Army.*

## RUSSIAN HOSPITAL CORPS.

In addition to the doctors and apothecaries in the medical corps of the army, there are feldshers, medical students, female nurses, who are called "sisters," and male attendants, who are called "sanitats." These men are nothing more than soldiers who are taken from the ranks without preliminary training and given red-cross badges to wear on their left arms. Some of these men perform their duties very well. This work is mostly manual, such as carrying the sick and wounded on stretchers and keeping the hospital wards in order, etc. Some of these men become feldshers.

The apothecaries in the Russian army constitute a distinct force. They can rise in rank from feldscher apothecaries through the successive "chin" ranks to the grades of brigadier-general; a very few advance to the rank of major-general. These men are usually assigned to duty on the immediate staffs of the medical inspectors of the different armies.

The duties of the apothecaries have to do with the drugs, surgical supplies, etc., of hospitals. They make out requisitions and usually occupy positions subservient to medical officers. They do not come in contact with the sick or wounded directly. We have no corresponding officers in our Army.

There are two classes of apothecaries. In the first the training starts at the age of 14 or 15 by a course in a gymnasium; studies are continued for four years, paying especial attention to Latin. When this course is finished the students enter drug stores and here work and study for four years more. During this period they are called "apothecary scholars." When this course is completed and a successful examination passed the "apothecary scholars" enter a university. The course lasts for two years, and while here they are called "assistant provisors." After graduating they become "provisors."

In the second class the pupils when 14 years of age enter what are called "pharmaceutical schools." While here they perform practical work in laboratories, and finally graduate when about 21 years of age as "provisors."

While taking this course all students are excused from the usual compulsory military service at the age of 18, until they finish their course, when they are compelled to serve for one year. Exceptions to this rule are made when the son is an only child, or if he has but one younger brother, or if his father is old and unable to work. If such conditions exist he is placed in the first-class militia and but four weeks' military service every five years is required.

Apothecaries enter with the army relative rank of first lieutenant; after four years they are promoted to the rank of captain, and then in one or two years to the next higher grade. Advancement in the higher

"A SISTER" IN A FIELD HOSPITAL AT THE FRONT.

rades is by selection. As has been noted before, it is possible for hese men to reach the "chin" ranks of brigadier and major general.

Feldschers correspond to our sergeants or hospital stewards.

There is a regular military school for feldschers in St. Petersburg. After completing this course feldschers serve for four years. After he first two years they "declare themselves," as it is called, and state whether or not they desire to remain in the service. During this time hey are called "candidates." Most of the officials for the hospitals, such as "intendant officers," etc., are chosen from these men, and it is possible for them to advance to a high "chin" rank. Feldschers are also appointed from the hospital-corps men, or "sanitats," if they are competent to perform the more important duties.

Since the beginning of the war the medical schools, as well as all universities, have been closed owing to student riots, so a large number of students have been idle Some of the members of the two senior classes have been employed by the Government. They have performed the same work as some of the junior doctors, thereby gaining an invaluable experience for themselves. They have made good use of time that would otherwise have been wasted.

## FEMALE NURSES.

The female nurses are called "sisters." They did practically all of the nursing for the sick and wounded of the Russian army from the field hospitals back on the line of communication, in the transports, sanitary trains, in the base hospitals, and all along the trans-Siberian railway to Russia itself.

In all, there were in the neighborhood of five thousand women employed, some of them being graduate nurses from the hospitals of Russia. The training these women received is practically the same in length of service and subjects taught as the training courses in our hospitals.

The supply of these graduate nurses was, of course, not sufficient to meet the demand, so courses of lectures lasting six weeks were given by doctors in many cities. After finishing this course, the future "sister" spent three months in a hospital doing practical work. If she then passed an examination she was accepted as a full-fledged nurse and was assigned to duty, usually with some hospital, or wherever her services were needed.

Many women from the best ranks of society gave their services as nurses during the war. Women whose fathers, brothers, and relatives were officers often went to the front and worked in the hospitals with the sick and wounded most faithfully. The Russian women are generally blessed with strong physiques, and the amount of work and the untiring manner in which they performed their duties elicited the highest praise from all who observed their work. The soldiers regarded the "sisters" with the greatest respect, and "sisters" were saluted by them in the same manner as officers.

The question of whether it is advisable to have women nurses in the field is still an open one. The Russian women adapted themselves to life in the field as well as the men. Many of them, in fact, were in better health at the end of the war than they were at the beginning. This was undoubtedly due to the outdoor life that they led.

33657—06——2

## FIELD ORGANIZATION.

In the Russian army the hospital unit, so to speak, is the field hospital. This has in its complement six or seven "sisters." They comprise a most important part of the organization. A hospital with its force disorganized certainly can not perform efficient work. A surgeon does his best work with his trained assistants. So, then, if women nurses are a part of the hospital to start with, they certainly should continue with it, except, of course, they should not be exposed on the firing line. A field hospital can usually be so placed and moved that it will be out of harm's way during a fight. The Russian "sisters" invariably went with their respective hospitals and were on hand at all times during the fighting. In fact, they were where they were most needed. The Russian women went to their country's aid in the hour of need, they were actuated by a most patriotic sense, they performed an immense amount of work in a most noble and self-sacrificing manner, and by their example they often inspired the soldiers to a better performance of their work. Indeed, if the work they performed had been left undone it might have transpired that the spirit of the Russian army would have been very much depressed by disease and by the lack of attention to its sick and wounded. It is only necessary, when debating the question as to whether or not women nurses should have a place with an army in the field, to watch the "sisters" at work in the operating and dressing rooms, in the wards of field hospitals, on sanitary transports, on sanitary trains, at all hours of the day and night, and observe with what natural gentleness all the details of their work is performed; to note, also, the look of thankfulness and relief that comes from some poor sick or wounded soldier's eyes as he is made comfortable by a "sister's" ministrations. The services of these women were invaluable and were performed in a far more satisfactory manner than could possibly have been done by male attendants.

## RUSSIAN RED CROSS SERVICE.

The Russian Red Cross is the largest and most powerful of its kind in the world. It is really a Government institution. At its head is the Czarina. The Dowager Empress in St. Petersburg and the Grand Duchess Elizabeth, who is the widow of the recently murdered Grand Duke Sergius, in Moscow, direct the different parts of the society in their respective cities. Prince Obalinski is the business head. His headquarters are in St. Petersburg in a large building. Directly under him are the heads of the different departments of transportation, supplies, etc. The work of the society is run on business lines, with each department fully organized. All the high officials are connected in some manner with the Government, so it can be seen that this society can not be spoken of as a private one.

There are four divisions of the Red Cross doing work with the troops:

(1) The Red Cross society proper;
(2) The Zemstvo Red Cross;
(3) The nobility Red Cross;
(4) Individual Red Cross.

The Red Cross society proper exists in time of peace as well as in war. Its organization is kept intact by means of hospitals, which it

maintains in all the large cities of Russia. The personnel of these institutions is immediately available in case of war. Nurses are trained at these hospitals with the especial view of being of use in case of necessity. Their training is as thorough as that received in all large training schools. In the Far East the organization of the Red Cross is divided into two districts, each with its own chief director. The first district comprises the trans-Siberian railway from Tscheliabinsk to Irkoutsk, all the Lake Baikal region east as far as Manchuria Station, which is near the northwest boundary of Manchuria, and to the north, including the region about Stretensk on the Amur River. In charge of this district is Senator Von Kaufman, an enormously rich man, who has become widely known by his liberal donations to the Red Cross Society. The second district is the more important, and includes practically all the so-called "Far East." It extends eastward from Manchuria Station and embraces all Russian Manchuria and the Vladivostok region. Prince Wasillschikov directs all matters pertaining to the Red Cross of this division.

The hospital buildings have been placed on the railroad lines where practicable. At the front, of course, the Red Cross hospitals were assigned where most needed. Many of these hospitals were placed in buildings already constructed. In a few cases buildings were erected solely for hospital purposes. In Harbin, as well as in other places, school buildings, barracks, hotels, in fact, all large buildings were utilized for hospital purposes. In every place along the Siberian Railway throughout Siberia and Manchuria the largest and best buildings were utilized for treatment of the sick and wounded.

The funds for the support of the Red Cross Society proper are obtained from many sources. Small banks marked with a red cross are placed in all cafés and public places. People are supposed to contribute at all times. A certain percentage of every theater ticket sold goes to the Red Cross. This is managed by the use of stamps. A revenue is obtained by the sale of post cards. A certain sum is paid to the Red Cross by every person leaving Russia. Small Red Cross badges are sold for $5. Larger jeweled ones, entitling the buyer to certain citizenship rights, are sold for $250. The Government also donates large sums to meet deficiencies. It can readily be seen that the income received by the Red Cross is very large. There has been much scandal caused by misappropriation of the society's funds, and vast sums of money have gone astray. This was especially true in the beginning of the war. So dissatisfied were many people with the methods of the Red Cross that they refused to contribute to its further support. The country people, known as the Zemstvo, organized a separate society, and, while it is known as the Zemstvo Red Cross, there is no connection with the Red Cross Society proper. Its organization is entirely distinct. This Zemstvo Red Cross is supported entirely by voluntary subscriptions from the country people. The feeling toward the Red Cross proper is quite bitter. The old organization wishes the new Zemstvo Red Cross to join its ranks, but at present the Zemstvo prefers to keep entirely separate, and will probably continue to do so.

The Zemstvo Red Cross confined its work to hospitals, of which it had a number, all situated along the railroad lines (together they contain 2,000 beds) and to "Etap stations." These were feeding and resting places for soldiers. Meals were served to all who needed nour-

ishment. As these stations were placed in places that soldiers reached after fatiguing journeys, they performed a most humane and appreciated work. All disinterested people speak most highly of the work of this organization.

The Nobility Red Cross is, as its name indicates, supported by the nobility without drawing on the funds of the Red Cross proper. Several hospitals, transports, and an operating train were supplied in this manner.

The Individual Red Cross included all the hospitals, sanitary trains, etc., supported by individuals or individual cities. There were many of these organizations. Each city of any size in Russia supported one or more hospitals in Manchuria. The doctors, nurses, all attendants, and nursing expenses were supplied from its own separate source.

The following data was obtained from the Red Cross headquarters in Harbin:

There are in the district of the "Far East," under Prince Wasiwillschikov, 85 permanent hospitals (permanent), total capacity 22,000 beds; 40 field hospitals, with necessary outfits for transportation, lazarettes, temporary stretchers, 25,000 beds; 23 sanitary trains, 12,000 beds.

Total medical personnel: Doctors, about 500; sisters, about 1,500; pharmacists, 30; medical students, 80; male attendants, 2,000.

The monthly pay of the personnel is as follows: Surgeons in charge, $250; assistant surgeons, $175; sisters, $15; pharmacists and medical students, $38 to $63; male attendants, $15.

Since the outbreak of the war up to May 14,1905, the total number of days in hospital by sick and wounded have been more than 3,000,000.

The average cost of patients for food, treatment, medicines, linen, etc., have been: Officers, 63 to 75 cents a day; soldiers, 38 to 50 cents a day.

The sanitary trains have transported from October, 1904, to May 14, 1905, 242 officers and 41,360 soldiers.

These have spent 314,734 days in the course of transportation.

The Red Cross society issues an official bulletin about once every two months. This paper may be obtained at all the public newsstands. In it are published many items of general interest, Red Cross notes, and statistics regarding the number of wounded and sick treated by the various institutions. These figures are not always as reliable as those obtained from the military statistical office.

The people of Russia are most sympathetic; they lavish their private means most generously for the care and treatment of the sick. From the Czar and Czarina down through the nobility to the common soldier himself this sympathetic spirit manifests itself at all times. The sick and wounded are cared for in a most luxurious manner. It has been frequently said that the Russians care too much for their disabled soldiers for their own welfare.

In addition to their contributions to the Red Cross, the Czarina, the Dowager Empress, the grand dukes and grand duchesses, Princess Yusapouff, and other people of large means supported individual hospitals, sanitary trains, hospital barges, ambulance trains, etc., out of their own private means.

The imperial pa[illegible] in St. Petersburg and Moscow were used by the Red Cross Soci[illegible] preparation of clothing for the sick. In the

large salons of the palaces, among the wealth and splendor that the rulers of Russia had gathered about them, were during the war placed everywhere sewing machines, benches, great piles of clothing, and large quantities of finished garments, all ready to be sent to the front. Women from all stations in life, the wives, sisters, and relatives of the officers and soldiers, came here daily and worked side by side from early morning till evening. These patriotic women did all in their power to help alleviate the suffering that naturally falls to the lot of a soldier in an active campaign.

There was considerable ill feeling existing between the medical department of the army and that of the Red Cross. The army people claimed that the Red Cross were always given the best buildings for their hospitals and conducted their hospitals in such a manner as to tend to the destruction of discipline of both officers and men; also that the daily expense of patients treated was far too much. The Red Cross people, on the other hand, considered that they were, as a class, better than the military medical department and performed better work. The Red Cross doctors received about twice the pay of their corresponding grades in the army medical corps. The Red Cross, too, had innumerable supplies in the form of medicines, instruments, and clothing to distribute. Some of the very best surgeons in Russia were in the service of the Red Cross, such men as Doctor Butz, of St. Petersburg, and Professor Maunteufel, of Dorport University.

Be this as it may, the military medical department and the Red Cross often worked hand in hand, and they together accomplished an amount of work that will never be forgotten by the Russian army proper.

The question of how far the medical departments of an army should depend on Red Cross organizations in time of war is a vital one the world over. If a country deliberately engages in war with another country, it should with as much deliberation make preparations for the results of its actions. It should be prepared, through its medical organization, to treat and look after the sick and wounded from the front to the base hospitals that will naturally follow.

Red Cross societies during war times appeal directly not only to the population at large, but to individuals. Through the medium of a Red Cross society funds and services can be utilized to great advantage. If the military medical organization attend to all the actual work in the field with the army back to the different bases, use could be made here of the Red Cross charities to good advantage if their services were needed. Their hospitals and supplies could be placed directly under military control. If this plan were followed, there certainly would be no jealousies, the discipline of patients under treatment would be under control, and the records of the individual cases would be properly filed for future reference.

The number of the wounded and sick can be roughly computed from the size of the army and the character of the country in which the campaign is to be carried on. Colonel Hoff, of the United States Army, who has made a special study of army medical organizations, states that provision in the form of beds and stretchers should be made for treating, in round numbers, 25 per cent of the fighting force from the firing line by transport, field hospitals, rest stations, sanitary trains, and base hospitals.

## PROVISIONS FOR CARE OF SICK AND WOUNDED.

The medical department of the Russian army had, with the Red Cross, facilities for treating this number of sick and wounded. During the periods of inactivity between fights there were thousands of beds empty, but the hospitals were taxed to their utmost capacity after all the large engagements. A mental picture of thousands of wounded and sick lying on a battlefield being carried to the dressing stations and field hospitals, and farther by sanitary trains to the base hospitals, should always be borne in mind by the medical departments of armies when perfecting their organization. Criticism never follows if the wounded are quickly handled and well cared for. On the other hand, what a gruesome picture would be presented if after a battle the wounded, or even a part of them, were allowed to remain where they had fallen, unsheltered from the cold or rain, unfed, uncared for, many good and brave hearts gradually ceasing to beat because the country for which the men were giving their lives was actuated by a spirit of economy in providing stretchers, transports, and hospitals. Far better, then, to organize on broad lines for the work in the beginning.

The magnitude of the preparations the Russians made for the treatment of the sick and wounded was the most striking feature of the medical aspect of the war. With the army there were in all nearly 3,000 doctors—one doctor to about 380 men.

The exact number of beds available for the sick and wounded is hard to determine, for the beds in the barracks, if necessary, could be counted as hospital beds. New buildings were constantly being erected. For instance, in Irkutsk the hospital population fluctuated in the neighborhood of 20,000. The city could, if necessary, have accommodated 40,000 patients. In Omsk, Streitensk, on the Amur, there were several thousands of sick and wounded. In Varkhui-Udinsk, east of Lake Baikal, there were when peace was declared 10,000 patients in hospitals. Farther east on the railway line, at Tchita, there is an enormous hospital city just about completed. In all, there are 160 buildings, ranging in size from 25 by 40 to 65 by 125 feet. The buildings are built on stone foundations, well ventilated, of solid logs. Water is pumped from deep wells into tanks, and is then distributed to the various buildings. The heating is accomplished by steam and Russian stoves, in which wood is burned. There is also a very good sewage system installed. Here there are accommodations for 10,000 sick. If we stop to consider for a moment and call to mind some towns with a population of 10,000 and imagine all the people provided with beds in large buildings, we will have a good conception of the size of one of these hospital towns. Farther eastward is Tsitsikar, Habarosk, on the Amur, Nikolsk, between Vladivostok and Harbin. All these places may be considered as hospital centers. In addition to these there were hospitals, military and Red Cross, all along the railroad lines eastward from Harbin toward Vladivostok and southward toward the army in the field. In Harbin, according to the military statistical officer, there were 19,200 beds for men and 960 for officers in the military and Red Cross hospitals; in addition to these, the "convalescent camp" could accommodate 15,000 men. After the battle of Mukden there were over 60,000 sick and wounded in Harbin at one time. Many slept on stretchers, but all were under shelter and were well cared for.

In and about Vladivostok, with a garrison of 90,000 men, there were in operation 1 local hospital lazarette, with 200 beds; 3 fortress hospitals, each with 420 beds; 13 field hospitals, each with 210 beds; local Red Cross hospital, with 105 beds; Tula Red Cross hospital, with 200 beds; Kauffman Red Cross hospital, with 600 beds (200 beds opened); Count Shouvaloff Red Cross hospital, with 240 beds (150 beds opened); Warsaw Red Cross hospital, with 300 beds (150 beds opened).

In addition to these there were in reserve 50 field hospitals (210 beds each), 5 joint hospitals (420 beds each), enormous storehouses containing 75 additional hospital tents, bedding, blankets, clothing, and medical stores sufficient, according to Chief Surgeon Chervinsky, for a garrison of 90,000 for three years under war conditions.

On a war basis in the Russian army there are 250 men in a company, 16 companies to a regiment of 4 battalions, making 4,000 men; 2 regiments in a brigade, and 2 brigades in a division (16,000 men), and usually 2 divisions to an army corps. Each company is supplied with 2 stretchers; in each battalion there are 21 beds, and in 4 battalions, or a regiment, there are four times this number, or 84 beds, counting stretchers as such, which, if we compute on the basis of 20,000 men in a full division, makes roughly about 2 per cent of beds. With each division there are 2 field hospitals, 420 beds, which is also about 2 per cent of the force. So this 4 per cent, with 1 per cent of beds supplied by Red Cross organizations, makes 5 per cent of total force that can be provided for at the front.

On the lines of communication, including beds on the sanitary trains and transports, beds in the evacuation hospitals, rest stations, and in all hospitals from the front to the real base, which was at Harbin, the Russians had made provisions for caring for 5 per cent more of the total force. At Harbin, and back of this point to Russia, there were beds for about 10 per cent of force, and in hospitals in Russia proper 5 per cent. If all stretchers and beds were occupied at one time, 25 per cent of the total force would have been provided for.

The following table embraces the official allowance of sanitary, medical, and veterinary wagons. This allowance was not strictly followed, for it was found that the character of the country did not admit of some of the prescribed methods of transportation:

| | Medical carts (2 wheels). | Sanitary carts (1-horse, 2 wheels). | Sanitary wagons (4 wheels). | Ambulance wagons (4 wheels). | One-horse carts (2 wheels). | Veterinary carts (1-horse, 2 wheels). |
|---|---|---|---|---|---|---|
| Field hospital | ..... | ..... | 8 | 4 | 8 | ..... |
| Division lazarette | ..... | ..... | 15 | 9 | 3 | ..... |
| Flying-artillery parks | 1 | 1 | ..... | 1 | ..... | ..... |
| Military medical convoy | ..... | ..... | 7 | ..... | 1 | ..... |
| Division surgeon: | | | | | | |
| Cavalry | ..... | ..... | ..... | ..... | 1 | ..... |
| Infantry | ..... | ..... | 1 | ..... | ..... | ..... |
| Corps surgeon | ..... | ..... | 1 | ..... | ..... | ..... |
| Infantry regiments, first line | 4 | ..... | 1 | ..... | ..... | ..... |
| Rifle regiments, first line | 2 | ..... | 1 | 2 | ..... | ..... |
| Cavalry regiments: | | | | | | |
| First line | 1 | ..... | ..... | ..... | 2 | ..... |
| Second line | ..... | ..... | ..... | ..... | ..... | 1 |
| Cossack regiment of 6 sotnias, first line | 1 | ..... | ..... | ..... | 2 | 1 |
| Artillery, six batteries, first line | 2 | 1 | ..... | 3 | ..... | ..... |
| Staff artillery, mortars | 2 | 1 | ..... | ..... | 2 | ..... |
| Pontoon battalion | 1 | 1 | ..... | 1 | ..... | ..... |

## CLIMATIC AND SANITARY CONDITIONS IN MANCHURIA.

That portion of Manchuria between Harbin and Port Art generally speaking, a rolling country to the westward of the r line, higher and more hilly to the eastward. The land is thick tled, very rich, and well cultivated by the native Chinese. It watered and traversed by streams and some large rivers. T however, is scarce to the north.

The native population consists of about 16,000,000 Chinese raise large crops of grain, wheat, kaoliang, buckwheat, millet, toes, and beans (from which oil is obtained), cattle, chickens, pig sheep. Goats are also raised in large numbers.

The surface soil is a black loamy clay which, when it become with rain, is very sticky, and when it dries becomes hard and verizes into fine dust.

The climate is very severe in winter. There is practically no s but the thermometer usually registers below zero. The air is however, and the cold is not felt except when it is windy; then piercing. In summer, during June, July, and August, it usually a great deal. During this time the country is impassable. The seems to have no bottom in places, and transportation by carts is of the question. The only way to travel is by horseback or by railroads. Fighting, while the country was in this soggy condit on, was not to be thought of, for the troops could not move. The Chinamen do all their transporting of grain and bean oil for export in the fall and winter. The ground is then frozen hard and the roads very good.

The natural richness and productiveness of the country was of great value to the Russians, who were so far from their home base of supplies.

With all this disagreeable climate the country is remarkably healthy. There is practically no malaria, cholera, nor plague indigent. Typhoid fever has been endemic in some of the Chinese cities to a mild degree for many years. Shiga dysentery, during the summer months, also prevails among the inhabitants, but it is of a mild type and the percentage of deaths is very low, under 1 per cent.

The native Manchurians are well built, larger, stronger, and more robust than the Chinamen farther south. Their constitutions speak well for the general health conditions of their country.

Through this country the Russians were forced northward by the Japanese. The first land engagement was on April 6, 1904, when the Japanese occupied Wiju and the Russians retreated across the Yalu.

The battle of the Yalu lasted from April 29 to May 2, and resulted in a retreat on the part of the Russians. There was then a lull in the fighting until June 14, when the Russians retired from Wa-fang-kan. On July 25 General Oku drove the Russians back from their positions on the Ta-shin-chiao. This was followed by a general advance on the part of the Japanese on July 31, 1904.

The rains then made the country impassable, and there was a cessation of active hostilities until September 3, when General Kuropatkin ordered a general retreat. The Russians retreated again after the battle of the Sha-ho, on October 13–15. No fighting occurred subsequently until winter. From January 27–30 the battle of the

Shakhe River was contested; the Russians again retreated. The weather during this fight was bitter cold. Many of the wounded who were left in the field, owing to the retreat of the Russians, were frozen to death. Many of the contesting soldiers, both Japanese and Russians, were frost-bitten during this battle.

The last large engagement was that of Mukden, which raged for twelve days, from February 26 to March 10. The weather was not as cold as that during the fight of the Shakhe River, but was cold enough to make the moving troops wish for more shelter than they had.

During the progress of the war the Russians strengthened every department of their army.

The opposing lines of Russians and Japanese gradually widened out, until finally, at the last positions of the Russians, at Sepingi, the lines stretched 50 miles on each side of the railroad.

The Russians, during this retreat, were enabled to choose their positions, and naturally intrenched themselves on high ground, which, while it was primarily chosen on account of its strategical value, was also, from a sanitary point of view, of the utmost importance in maintaining the health of the army.

The camps of the Russians were always well placed on high ground. The tents were regularly laid out in streets and ditched and were aired in warm weather regularly. The camps were clean.

The Russians drained their camps and dwelling streets in the various towns by an elaborate system of ditches. These ditches were dug by the soldiers, and were usually from three to six feet wide and as deep as necessity demanded. It was found that a deep ditch would drain the surrounding soil, the explanation being that the surface clay was more impermeable to water than the soil at a lower depth. The Russians also burned all the refuse from their camps—all the soiled straw and bedding used by the horses. In the vicinity of each town and camp a certain space of ground was set apart for incinerating purposes, and here all waste materials were destroyed.

When the mud made transportation very difficult, débris from the camps and stables was often buried in ditches in the cities or in the camps proper.

Each Russian soldier carries a piece of canvas about 4 by 4 feet. This piece is joined with three other pieces and serves as a tent for four men. If the camp was temporary, the soldiers slept directly on the ground or on a little straw or grass, if it could be obtained. If the camp was to be permanent, two platforms were built, one on each side of the tent, with limbs and brush obtained from trees. Earth was piled up on the sides of tent and the canvas secured over the dirt wall. As soon as the weather began to get cold the soldiers dug into the ground and constructed their "zemliankas," dugouts. These were made by digging holes into the ground about 4 feet deep, lining the sides with twigs and boughs from trees; sometimes use was made of bamboo or kaoliang stalks for constructing an arched roof. Earth was placed over this to the thickness of a foot, and then on top of this the canvas was stretched to hold the dirt in position. These winter quarters offered a good protection against the wind and snow and were quite warm.

Chinese mud houses were often used for living quarters by small detachments of soldiers. These houses are similar in design to our

log cabins. The walls are made of mud bricks, and plenty of light is provided by large windows. The roofs were thatched and covered with earth.

The refuse from the kitchens was very small and was easily disposed of by carting away and burning.

In the matter of constructing and taking care of sinks in the field the Russians have much to learn. The holes were invariably too shallow They were poorly screened by brush, and no attempt to cover the excreta was made in some camps. In others it was improperly covered. When these places were abandoned many times the ditches were not filled up.

The possibility of transference of disease by means of flies was often not appreciated. Official orders were issued by Medical Inspector Gabasivitch in regard to the placing and construction of these sinks. His orders were often not carried out by the line officers. True it is that it was very difficult to make the common Russian soldier change his lifelong habits and appreciate the importance of so doing.

The individual Russian soldier varied a great deal. Most of them were taken from the peasant class, but from widely separated parts of the country. The first soldiers sent out were men too old for active campaigning. Many were married and naturally took little interest in the war. The Russian Government soon saw its mistake, and then recruited young men between the ages of 20 and 30. These men came from the Baltic provinces, from the south of Russia, Russia proper, the Caucasian Mountains, and Siberia. The types of men were different. They spoke different languages and were for the most part illiterate. Taking an average, the men were larger and heavier than our soldiers and possessed of far better physiques. Their chest and hip developments were noticeably larger; they were accustomed to a plain diet, for the most part black rye bread and soup.

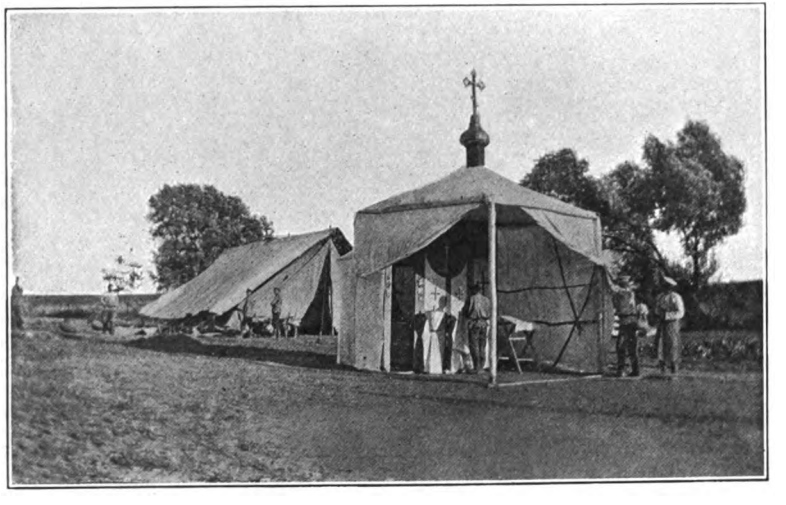
The out-of-door existence which they had led was plainly stamped on their healthy countenances. Lack of shelter and poor rations for periods of days were matters that did not cause discontent among these men.

All Russians are very religious. It is more a religious fear than true religion. The church is omnipresent. At the beginning of the war troops took their "ikons," or sacred pictures, into battle with them. They soon learned that these gave little protection against the enemy's fire. So one proof of the foundation of their church was shown to be useless. Many of the soldiers are now asking for less religion and more education.

Instead of being possessed of brutal dispositions, as so often has been pictured, the world now knows that this is only true of a very small percentage of the Russian soldiers. In fact, their dispositions are like those of any other peasants—simple and sympathetic to a degree. They lead absolutely simple lives and have no vicious habits.

The pay of a soldier is about 23 cents a month. After he has bought a little sugar and tobacco there is very little left to spend for drink even if he desired to do so. There was a strict regulation enforced among the Chinese against the sale of any alcoholic beverage to soldiers.

Every soldier was supposed to wear, suspended from his neck, a small brass identification tag with his number and regiment stamped



A CHURCH IN A FIELD HOSPITAL.

upon it. Very few soldiers were provided with these and, as their clothes were imperfectly marked, there was no way to identify a dead or unconscious man, except by personal recognition.

The uniforms of the Russians varied quite a little. They generally had a summer and winter outfit. Some, however, noticeably the Caucasians, wore the same garments summer and winter. The war taught the Russians many lessons, one of which was that their blue and white uniforms were too conspicuous. So khaki was being universally adopted just before hostilities were suspended.

In summer the men wore khaki caps usually provided with screens for the neck, cotton shirts, a khaki blouse and trousers, and long black or russet leather boots. The blouse was loose and comfortable. In place of socks the men used square pieces of cloth, usually cotton, which they wrapped about their feet and secured with strings. These were not supplied by the Government, as were the other clothes, so that there was no uniformity in texture of the material.

The Russian leather is very soft, and with it excellent boots are made. The soldiers are accustomed to wearing boots from early boyhood. Shoes would not have been as serviceable in muddy weather or in winter. As an additional protection against the cold, the soldiers wrapped newspapers about their feet and legs over the cotton cloth, then put on the boots, and over these they used heavy felt overboots, which they called "valenki." Feet protected in this manner were rarely frost-bitten.

The Russians suffer little from sore feet. They are rarely disabled while marching on this account. Many of the men go barefooted when not on duty in the summer. By so doing they harden and toughen their feet, a most excellent training.

In winter heavy khaki-colored cloth uniforms were issued. The large loose khaki-colored overcoats of the men were most useful; they served as raincoats, as overcoats, and as blankets. In winter this amount of clothing was not sufficient, so each soldier wore several shirts. Coats lined with sheepskin or fur were very generally worn. The head was protected by a cloth or a sheepskin cap, and further by a hood. For protection of the hands heavy gloves or mittens were used.

In summer the men bathed in the streams, washed their clothes, and kept fairly clean, but in winter, apparently when once dressed, they trouble themselves little about washing. The intense cold was, of course, in a measure responsible for this. Orders were issued requiring men to bathe and wash their clothes once a week. This order could not be carried out because bath houses were too scarce, and in many places fuel could not be spared for heating enough water to supply all hands. The fact that the men in the ranks were not cleaner reflected on the line officers.

The soldier part of the Russian army, as a body, in the opinion of many foreign military attachés, was second to none in the world's history. The men were young, vigorous, well nourished, clothed, and equipped. They were all willing to perform any duty asked of them cheerfully. Their spirit was good, and they possessed the necessary courage for fighting. This was proved time and again. Every day the war lasted the soldiers were learning, their eyes were being opened, and the pall of ignorance that had hung over them so long was gradually being lifted. The war, for the peasant class of Russia, bringing

them as it did in touch with the outside world, and with one another has meant much to them. Religious superstition has been, in a measure, dispersed. The awe in which all classes regarded the Government and all its officials has now disappeared. The peasant mind has received a stimulus which is bound to better their condition.

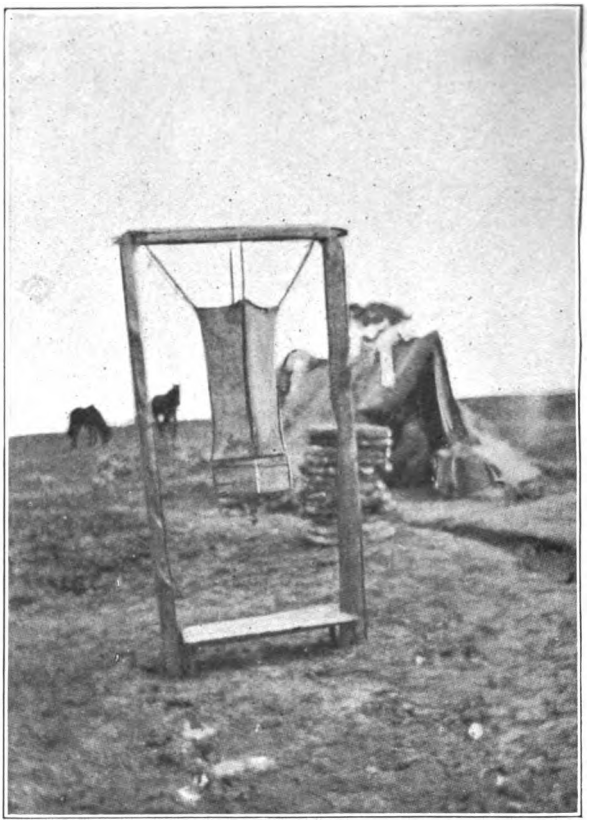
The diet of the Russian soldier is very simple. Each man is allowed 1 pound of meat and 2½ pounds of black rye bread with tea, daily. The meat is incorporated in a vegetable soup in which cabbage is very conspicuous. Boiled buckwheat, known as "kasha," is at times also issued.

Practically all the meat that the Russians used for the troops was fresh. The cattle were obtained from Manchuria and Mongolia. They were bought by the commissary officers of the respective regiments, and driven by soldiers detailed for this duty at times for a distance of several hundred miles to their destination. Every regiment had its drove of cattle and sheep as a part of its complement. These cattle were large and well nourished, and compared very favorably with our sources of beef and mutton. The supply of meat was sufficient to supply all the soldiers except under extraordinary conditions.

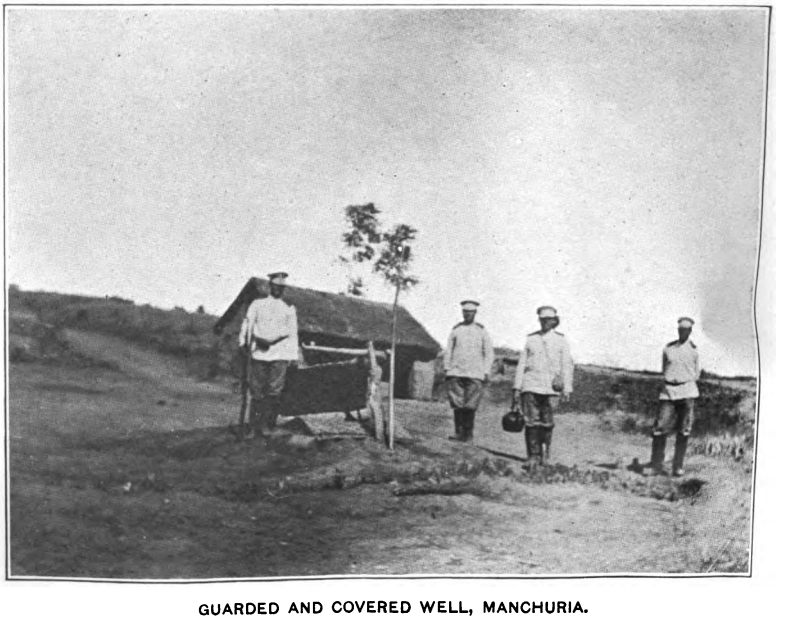
The veterinary department of the army performed right here a most valuable service. Cattle in Manchuria and Mongolia suffer from pest when they are herded, and this disease is very apt to cause enormous losses. Fortunately for the Russians they have an excellent anti-pest serum which they prepare themselves in Siberia. All cattle were inoculated with this serum, with the result that pest rarely made its appearance amongst the fresh-meat supply of the army, so after the cattle once passed the border very few were lost by disease.

The flour for the bread that was supplied to the soldiers was made in large flour mills in Harbin, from grain grown in the surrounding country. These mills were erected during the war, and could easily make enough flour to supply bread for a million men.

In all villages of any size there were erected permanent bakeries for the purpose of supplying bread to troops in the vicinity. In addition to these bakeries with each army corps, there are usually three of the field bakeries. These bakeries moved with the troops as independent organizations. They consisted when erected of a row of 10 double ovens, back of which are 22 tents arranged in two rows. These tents are about 10 feet high, 10 feet broad, and 15 feet long. The first row back of the ovens is used for preparing the dough, shaping the loaves, etc.; the second row is used merely for stowing the loaves of bread after they have been baked. The whole bakery can be erected and making bread in twenty-four hours. The ovens are usually arranged in pairs. A pit is dug in front of the place on which the oven is to be made, a layer of bricks form the bottom of the oven, and over this strong curved iron frames are placed; these rest on the bricks and form an oven about 4 feet wide by 6 feet long by 2 feet high; over this iron framework dirt is banked for a depth of a foot. A tin stovepipe at one end and a door at the other completes the oven. A fire is built in the oven, using pieces of wood on which have been sprinkled some bean oil cake. This is lighted and makes a very hot fire. The oven is ready for baking in an hour. The ashes are pushed aside, or drawn out, and the molded loaves of dough are placed in this same compartment by means of long wooden spades. The retained heat in the oven is sufficient to bake the bread. The flour used for making the bread is



ASBESTOS FIELD CANVAS FILTER.



GUARDED AND COVERED WELL, MANCHURIA.

linary rye flour. This is mixed in troughs with hot water. In the ughs a small quantity of fermenting dough is kept, which is suffi- nt to make the dough rise. After this has been accomplished more ur is added, and when the dough is ready it is shaped into loaves means of oblong tin pans, and then these are placed in the ovens. The flour used for making bread for the officers is the same, only it passed through a sieve. The bread made from this flour is whiter ian the bread for the soldiers.

Each loaf weighs about 10 pounds and is sufficient for 4 soldiers, ach getting 2½ pounds daily.

Usually there are five or six bakings daily in the ovens. If neces- ary this could be doubled by working at night. There are two shifts f bakers and assistants, in all, 132 men, who work day on and day off.

Each double oven can bake about 500 loaves of bread daily. Each oaf weighs 10 pounds, so 10 double ovens, or a field bakery, turns out daily about 5,000 loaves, or 50,000 pounds of bread.

This bread is very nourishing and does not taste at all bad. The soldiers are very fond of it.

The Russians eat two meals a day, the first about 10 or 11 o'clock in the morning, the second about 4 or 5 in the afternoon. They eat with wooden spoons out of large tin cans, each can holding enough for about four or five men.

Their menu is always the same for all meals, day in and day out, soup and black bread. The men are satisfied and do not tire of the monotony. The ration is certainly sterile, for everything eaten is either cooked or boiled.

The fact that some scurvy did occur among the soldiers while they were on this diet showed that the diet was not an ideal one. The scarcity of vegetables in some places undoubtedly had some influence in development of this disease. There was a belief among the doctors that the development of scurvy did not always depend upon the character of the diet alone, but that conditions of living in badly ventilated dugouts during winter and the constant nervous tension under which the men existed were elements concerned in the causation of this malady. Surgeon Fehrman, of the Russian navy, who was in Port Arthur through the entire seige, stated that almost all the garrison, officers and men, had scurvy when the fortress capitulated. Some were affected much more than others. A great many were incapacitated for duty. He himself, although he had a fair diet, developed bleeding gums, and his teeth became loose. These symptoms were common among the officers. Scurvy, in his opinion, made its appearance among the officers and soldiers who underwent the longest and most continuous nervous strain sooner than it did with others who were on the same diet.

All the soldiers drink a great deal of tea. As it is made with boiling water it is sterile, and it satisfies thirst. Very much less unboiled water was consumed than would have been the case if the men had not been tea drinkers.

The habit of drinking weak tea instead of water is to be commended most highly, as everyone knows water, although it may look innocent, is capable at times of disorganizing and doing far more harm to an army than fierce attacks by a strong enemy. So, then, we should encourage all simple means of making it harmless.

The importance of supplying boiled water for the troops in Man-

churia was recognized by the medical authorities, so large numbers of movable apparatus, the principal of which was the Bouro system, were supplied as a part of the regular equipment of the troops.

The Bouro-system apparatus resembles a movable kitchen. Water by this system is quickly boiled. It usually takes but thirteen minutes after lighting the fire to produce twelve buckets of boiled water. The heated water passes through a water-cooled pipe, and it imparts its heat to the cooled water surrounding it. The system is a very good one, and by its use large quantities of palatable boiled water are made easily available.

There were a number of distillers for water in operation, also apparatus fitted with filters before the water was boiled.

In all the hospitals great attention was paid to the sterilization of the drinking water.

Throughout the country there were numerous streams and native Chinese wells. The water in the streams was dangerous, not only on account of being infected by the Chinese, but also from the infected matter deposited by the soldiers along the sources of supply. Despite the orders of Medical Inspector Gabasavitch the soldiers were careless in this matter. They did not realize the importance of keeping infected matter out of the water. The water in the different wells was examined by the doctors, but not always being provided at the immediate point with microscopes this examination was usually a chemical one. If the water showed a dangerous amount of ammonia or nitrates the well was filled up. Good water was obtained from many of the wells, and there was no reason why it should not have been if the source of water supply to the well was free from infected matter. On the other hand, there were some wells from which water was being used by the soldiers situated near infected streams. As long as this water was boiled all went well.

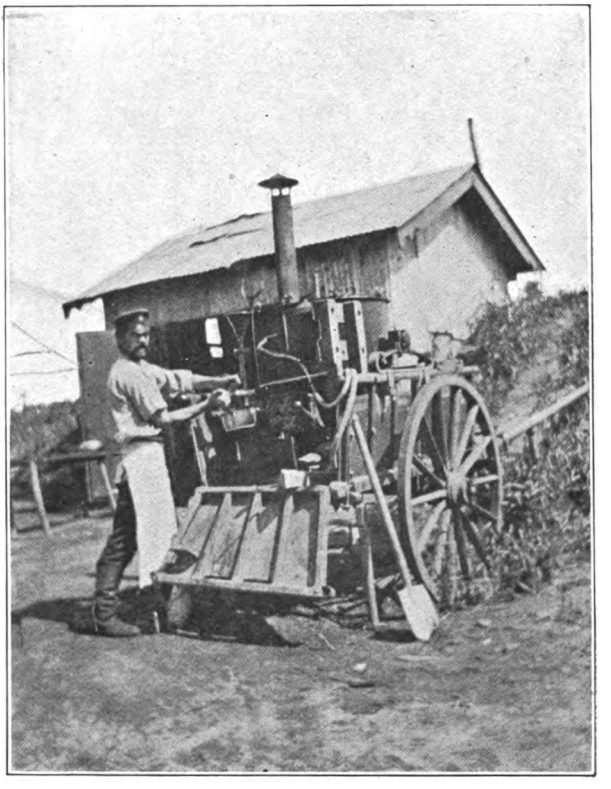
In the old towns of Mukden and Harbin the water was examined by the medical men more closely. Many wells in these places were found to contain water unfit for use. These wells were promptly filled up.

In many places in the cities and villages, also in the field with the troops, the wells were kept covered and guarded by sentries.

In some of the hospitals and camps water was drawn from wells and boiled in large iron retorts and allowed to cool. Great attention was paid to the water on the part of the medical men, but despite all precautions and warnings the soldiers did the same that all soldiers before them have done when they were on marches away from their usual camp surroundings, in that they quenched their thirst whenever opportunities presented themselves, regardless of the dangers of infected water. If officers, while they are on a retreat where they have lost everything, describe their paramount desire to just have one drink of something, no matter what, it is little wonder that the less-educated soldiers drink any water under the same conditions. It is a difficult problem to supply all soldiers under all war conditions with non-infected water, but it is one that should be solved in every camp if the health of the troops is to be properly guarded.

### MEDICAL ORGANIZATION, EQUIPMENT, TRANSPORTATION, ETC.

With each army in the field of the Russian military organization there were supposed to be three complete field bacteriological outfits, [illegible] doctors, assistants, and equipment. As a matter of fact,



FIELD WATER DISTILLER.

RUSSIAN FIELD KITCHEN.

this proportion of laboratories was not detailed. Each field laboratory was equipped with sufficient material in the way of microscopes, culture media, serums, and chemicals to make a positive diagnosis of typhoid fever, cholera, plague, and to perform the usual tests for the chemical impurities of water. These laboratories were also supplied with a case of drugs with directions for their use for the clarification and chemical purification of water. The bromine and alum methods of treating water were the ones described. As a matter of fact, these cases were seldom if ever used. The method of boiling the water before using was employed to the exclusion of others. If the water was muddy, it was often filtered before this procedure.

For filtering water almost every common filter was met with in various places. Berkfelt and Pasteur filters were the favorite ones in the hospitals. In the field a canvas bag, in which asbestos was used as a filtering material, seemed to be the most popular. The asbestos in these filters could be removed and disinfected by heating and replaced at regular intervals.

For handling the sick and wounded from the firing line back to the base hospitals the Russians had a large number of "sanitats" with haversacks full of first-aid packets, stretchers, stretcher bearers, transports, field hospitals, all so situated that they passed the disabled soldiers constantly toward the small De Cauville field railroads and the railroad proper to be placed on the sanitary trains which went northward and westward to the base hospitals. This current of the sick and wounded was constant and more or less regular, so that it was possible to run the hospital trains almost on a fixed schedule, except after a battle, when practically all the traffic of the railroad consisted of trains for the wounded.

Each soldier carried a first-aid package on his person, or strapped to the scabbard of his sword, if he wore one. This packet is about the same size as the one in use in our Army, and is covered with plaster, lined with rubber, and the edges securely sealed. Printed directions of how it is to be used are on the cover. The packet contains a 3½-inch gauze bandage 10 feet long and two pads made of cotton covered with pink gauze wrapped in paper, and a safety pin. The pads are 3½ by 6 inches, and are made by taking a thin layer of cotton 6 by 6 inches, covering both sides with one piece of gauze so as to overlap slightly; the two sides of the pad are then brought together and folded. The bandage and pads are impregnated with a solution of bichloride of mercury.

The soldiers, as a rule, understood the method of application of the contents of these packets, but they did not observe the golden rule, not to touch anything that comes in contact with the wound.

With each army corps there was a corps surgeon, who usually had the relative rank of a colonel. In each regiment there was a chief surgeon with several assistants, depending on the number of battalions, one surgeon to a battalion, in all usually five medical men. These surgeons stayed with the troops and established dressing stations during action.

Regimental organization was as follows: 5 surgeons, 22 orderlies, 32 litters, 16 carts, 16 feldschers, 128 litter bearers, 4 ambulances, several tents.

During an action the 5 surgeons, assisted by 6 feldschers, organized dressing stations in the immediate rear. The remaining 10 feldschers

remained with the troops to render first aid and send the wounded back to the dressing stations by the litter bearers, who usually numbered 8 per company, each company having 2 stretchers.

To supplement these there was organized for war what were called "division lazarettos," one to each division. These were concerned in the establishment of the principal dressing stations during an action, and when no action was imminent were available for any duty that might be assigned, but its organization was usually kept intact and ready.

The division surgeon, with his special aid, made his headquarters with the division lazaretto. In addition to the work with the lazaretto he overlooked the workings of the field hospitals and dressing stations.

Division lazaretto No. 44 was as follows:

| | |
|---|---|
| Chief surgeon of the division (with rank of brigadier-general) | 1 |
| Aid, rank of colonel | 1 |
| Assistant surgeons | 4 |
| Veterinary doctor | 1 |
| Feldschers | 4 |
| Sanitats (stretcher bearers, etc.) | 250 |
| Drivers | 62 |
| Carts for instruments and medical personnel (doctors rode individual horses) | 8 |
| Stretchers (50 stretchers, 67 in two-wheeled carts—2 in each cart) | 117 |
| Large hospital tents, officers' tents, and tents for personnel | 4 |
| Horses | 87 |

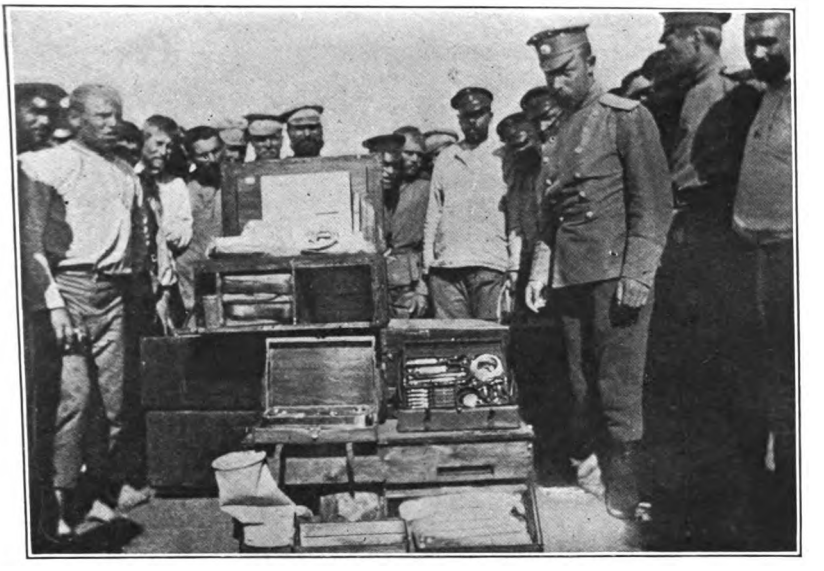
The instruments were the same as were supplied to the field hospitals and were carried in wooden cases and rested in compartments made of wood. The medicines were the same as supplied to field hospitals also. They were carried in large glass bottles in wooden cases.

The supply of first-aid packets, gauze, and bandages was sufficient to dress 1,000 wounded.

Food for the personnel and for patients was also carried with the lazaretto.

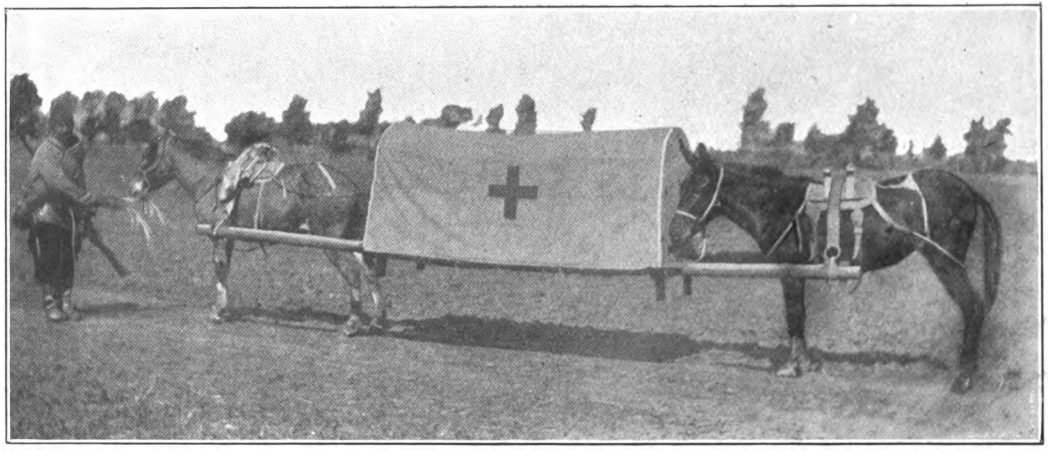
A feature of these lazarettos was a money wagon. In this wagon were kept several thousand rubles, subject to the order of the medical officer in command. When money was needed to pay for food, horses, or, in fact, anything connected with the lazaretto, a simple order to one of the doctors, who acted as paymaster for the medical officer in command, was all that was necessary. In this manner, in the rich Manchurian country, supplies of food for the sick, wounded, and personnel could be bought from the native Chinese, thereby saving the annoyance and trouble of transporting these various articles from place to place.

Most of the wounded passed through these lazarettos at the principal dressing stations. Practically no operating was done. Cases without dressings were dressed, dressings were reapplied or reenforced, if necessary, and the wounded were given nourishment. Splints were applied when needed. Many surgeons made use of kaoliang stalks for this purpose. These stalks resemble, when dry, small sticks of bamboo, are light, elastic, and when strung together can be cut to the desired length, and really make an almost ideal temporary splint for a fractured leg or arm, as the splint could be made to encircle the fractured member and held securely in position by a few turns of the bandage.



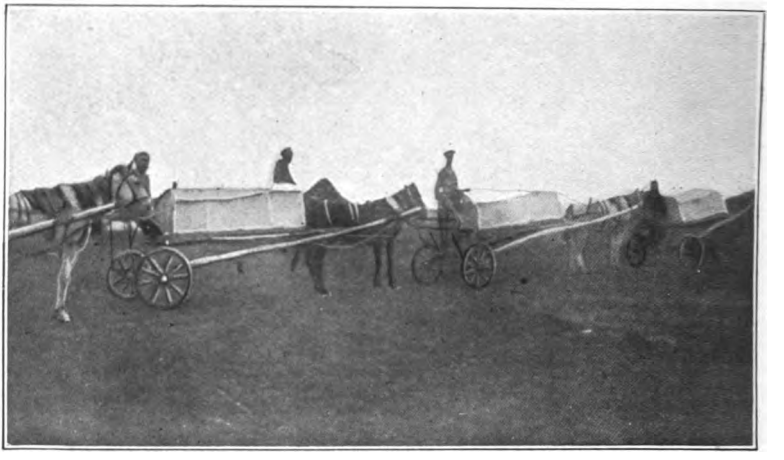
SURGICAL DRESSING CHEST, DIVISION LAZARETTO NO. 44.

CHEST OF INSTRUMENTS, DIVISION LAZARETTO NO. 44.



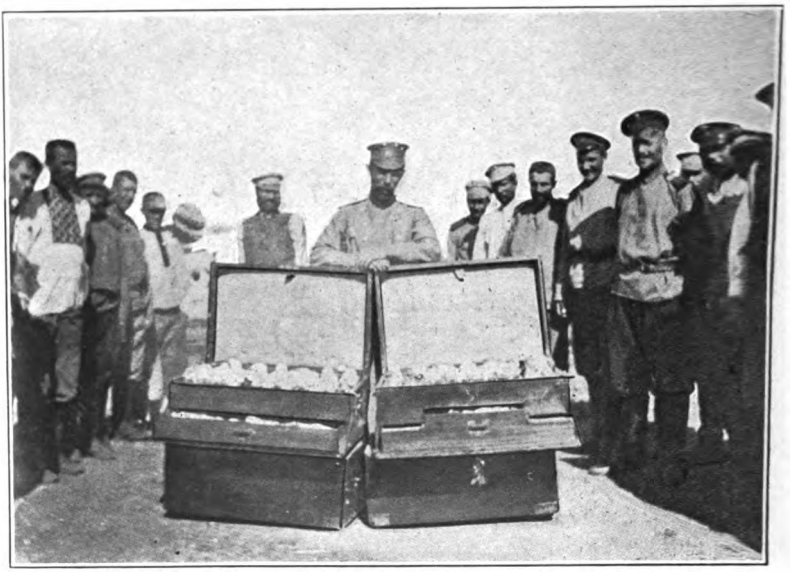
RUSSIAN HORSE LITTER.

RUSSIAN HORSE LITTERS IN USE NEAR HIRSU.

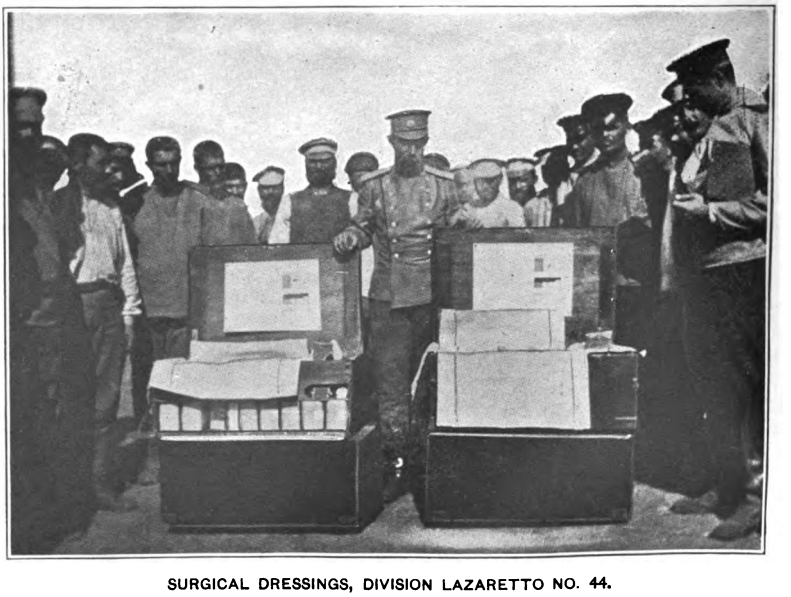


HORSE LITTERS, UNDER WAY.

HORSE LITTER, INSIDE VIEW.



MEDICINE CHEST, DIVISION LAZARETTO NO. 44.



SURGICAL DRESSINGS, DIVISION LAZARETTO NO. 44.

At some of these dressing stations the doctors, when not pressed with work, instead of merely applying a good protective dressing, camponned wounds with gauze. Almost always wounds so treated became infected, and the doctors in the base hospitals were of the decided opinion that the wounds were infected in direct proportion to the amount of handling and treatment they had received on their way back from the front. The best surgeons stated positively that the best results were obtained in those wounds that had only had one good dressing applied. Wounds were dressed at these places in the usual manner. Tincture of iodine was applied by some doctors to large and small uncovered surfaces.

For transporting the wounded from the dressing stations to the field hospitals there were organized what were called "sanitary transports." They consisted of—

| | |
|---|---|
| Commandant (a line officer, colonel) | 1 |
| Doctors | 2 |
| Feldschers | 2 |
| Sisters | 2 |
| Sanitats | 10 |
| Soldiers, drivers, etc | 100 |
| Small two-wheeled carts (2 stretchers each) | 50 |
| Special two-wheeled horse litters (1 stretcher each) | 7 |
| Horses | 128 |
| Four-wheeled wagons | 5 |
| Cases of medical and surgical supplies | 5 |
| First-aid packets | 130 |

Material for dressing 500 wounded.
Provisions, tea, sugar, bouillon, etc., for feeding about 150 wounded.
Money for buying provisions as they may be needed is also always carried.

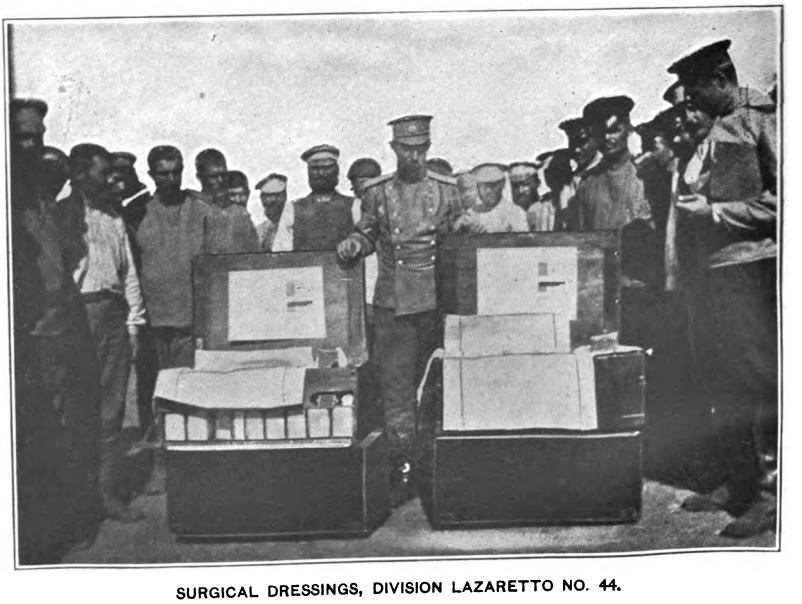
These transports, when no battle was imminent, were used to transport patients from the field hospitals to the sanitary trains on the De Cauville lines or on the railroad proper. They often carried patients 30 or 40 miles.

In addition to these transports, which of course were far too few to transport the wounded, there were mule and horse litters. This method of transportation was especially useful in rough country, and when the roads were impassable for carts by reason of mud. Wounded were carried by Chinese carts with native ponies. Cossacks often dismounted and placed the wounded on their horses and brought them to the rear. After battles all sorts of conveyances were pressed into service for the transportation of the wounded.

During the first part of the war it was thought that four-wheeled ambulances could be used. These were soon found to be too heavy for the muddy and rough country and could only be used in the cities. They were replaced by two-wheeled carts. Some of these, which were made in Finland, were supplied with springs and held two stretchers, were lined with felt in winter, and were fairly comfortable. The majority of the carts, however, were not provided with springs, and the sick and wounded were very much shaken up and consequently often exhausted after a long ride.

In Harbin there were a number of four-wheeled ambulances that were of a very good design. Four stretchers could be carried, two above the other two. The two top stretchers were swung from supports from the roof of the ambulance by means of straps, and after being hooked were pushed into position by means of small wheels

MEDICINE CHEST, DIVISION LAZARETTO NO. 44.



SURGICAL DRESSINGS, DIVISION LAZARETTO NO. 44.

At some of these dressing stations the doctors, when not pressed h work, instead of merely applying a good protective dressing, nponned wounds with gauze. Almost always wounds so treated ame infected, and the doctors in the base hospitals were of the ided opinion that the wounds were infected in direct proportion the amount of handling and treatment they had received on their y back from the front. The best surgeons stated positively that e best results were obtained in those wounds that had only had one od dressing applied. Wounds were dressed at these places in the ual manner. Tincture of iodine was applied by some doctors to rge and small uncovered surfaces.

For transporting the wounded from the dressing stations to the ld hospitals there were organized what were called "sanitary trans-orts." They consisted of—

| | |
|---|---|
| mmandant (a line officer, colonel) | 1 |
| octors | 2 |
| eldschers | 2 |
| isters | 2 |
| anitats | 10 |
| oldiers, drivers, etc | 100 |
| mall two-wheeled carts (2 stretchers each) | 50 |
| pecial two-wheeled horse litters (1 stretcher each) | 7 |
| Horses | 128 |
| Four-wheeled wagons | 5 |
| Cases of medical and surgical supplies | 5 |
| First-aid packets | 130 |

Material for dressing 500 wounded.
Provisions, tea, sugar, bouillon, etc., for feeding about 150 wounded.
Money for buying provisions as they may be needed is also always carried.

These transports, when no battle was imminent, were used to transport patients from the field hospitals to the sanitary trains on the De Cauville lines or on the railroad proper. They often carried patients 30 or 40 miles.

In addition to these transports, which of course were far too few to transport the wounded, there were mule and horse litters. This method of transportation was especially useful in rough country, and when the roads were impassable for carts by reason of mud. Wounded were carried by Chinese carts with native ponies. Cossacks often dismounted and placed the wounded on their horses and brought them to the rear. After battles all sorts of conveyances were pressed into service for the transportation of the wounded.

During the first part of the war it was thought that four-wheeled ambulances could be used. These were soon found to be too heavy for the muddy and rough country and could only be used in the cities. They were replaced by two-wheeled carts. Some of these, which were made in Finland, were supplied with springs and held two stretchers, were lined with felt in winter, and were fairly comfortable. The majority of the carts, however, were not provided with springs, and the sick and wounded were very much shaken up and consequently often exhausted after a long ride.

In Harbin there were a number of four-wheeled ambulances that were of a very good design. Four stretchers could be carried, two above the other two. The two top stretchers were swung from supports from the roof of the ambulance by means of straps, and after being hooked were pushed into position by means of small wheels

that ran in grooves. These ambulances carried several extra stretchers on top, were lined with felt, and some were heated by small stoves. All were provided with two large lights with reflectors, one in front on the forward edge of the roof and the other behind in a corresponding position.

The best ambulance for the country was a small Finnish two-wheeled wagon. This, as has already been said, was strong, was provided with springs, a most important feature, was warm in winter and cool in summer, and could be drawn through rough and muddy country. These small ambulances entirely replaced the larger ones in the field, as the large ones were found impracticable under service conditions. They were too heavy and easily became mired in the mud.

There were a number of independent Red Cross ambulance corps with the army. These were stationed where most needed and did excellent service.

The Russians have been criticised for their facilities for transporting the wounded from the firing lines back to the field hospitals and sanitary trains. Compared with the rest of the medical organization this part was somewhat weak, but when the character of the country, with at times almost impassable roads, when the enormous numbers of wounded following the different battles, when the constant retreat of the Russian forces are taken into account, all the critics will admit that the Russians did convey a majority of their wounded to the base hospitals, and this under difficult conditions.

The Russian field hospital is the unit of its medical organization. In all, east of Lake Baikal, there were 280 of these field hospitals, two of which accompanied each division. Others were detailed for special duty, such as isolation hospitals in various situations.

The organization of the different field hospitals differed somewhat, but was fairly constant.

The following was the organization of field hospital No. 33, with the Twenty-second Division, First Army Corps:

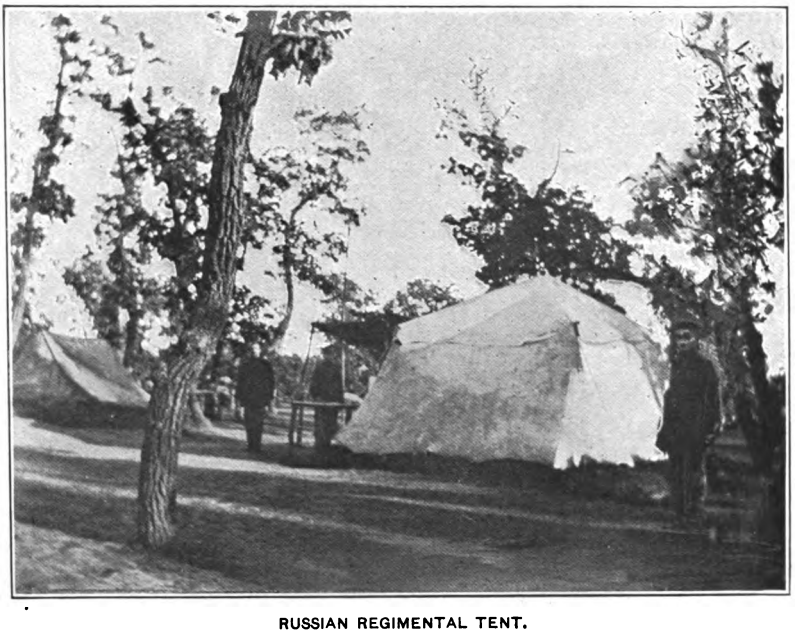
| | |
|---|---|
| Chief medical officer in command | 1 |
| Assistant surgeons | 4 |
| Line officer | 1 |
| Horses | 80 |
| Four-wheel wagons | 3 |
| Feldschers | 9 |
| Sisters | 5 |
| Sanatats | 115 |
| Two-wheel wagons | 26 |
| Hospital tents and tenting for personnel | 10 |
| Wooden cases of medicine, counting instruments and surgical dressings | 24 |
| Field kitchen and accessories | 1 |
| Bowro system for boiling water | 1 |

Stretchers, bedding, and clothing for 200 men and 10 officers.

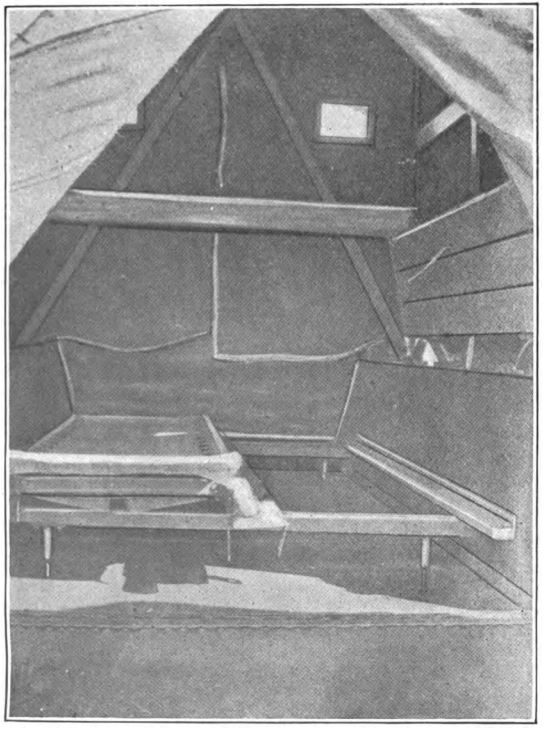
These hospitals were placed, during the fighting, in sheltered positions, usually 8 to 12 miles in the rear of the fighting line. To these hospitals many of the wounded came after passing through the dressing stations. Many walked. Others were brought in by ambulances and wagons of various descriptions. Some were carried by their comrades on regular or improvised stretchers.

There were a great variety of stretchers in use in the field. Most of them, however, were made of canvas supported on wood frames and braced at the ends. Some were supplied with movable wooden

EVACUATION HOSPITAL, GUNCHULIN.

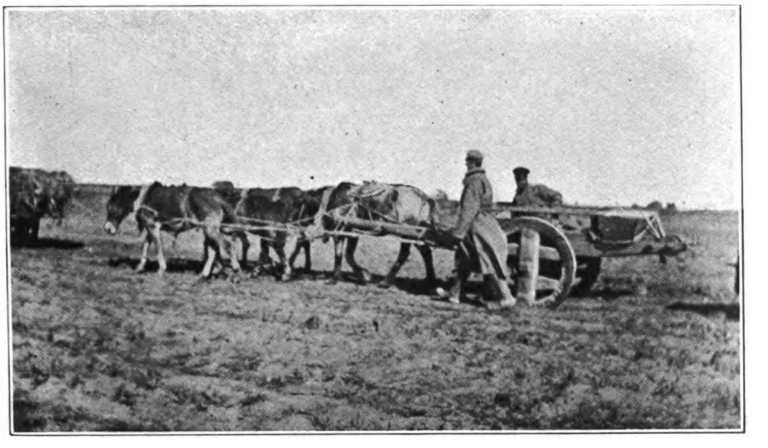


RUSSIAN REGIMENTAL TENT.



INTERIOR FINISH, AMBULANCE LINED WITH FELT.

PLACING PATIENT IN FOUR-WHEELED AMBULANCE, HARBIN.



TRANSPORTING SICK IN CHINESE CART.

TWO-WHEELED CART FITTED WITH STRETCHERS.

FIRST-AID DRESSING STATION, BATTLE LIOYANG.

RUSSIAN DRESSING STATION, MANCHURIA.

legs. In others the wooden legs folded under the side supports and were held in position when in use by means of pegs. Many of the stretchers were so constructed that the head was supported on a higher level than the rest of the body. This was accomplished by either raising or supporting the canvas at the head end of the stretcher or by supplying a pocket made of canvas, which, when filled with hay or grass, would serve as a pillow. A few stretchers were so constructed that by sewing the canvas, lateral support running the length of the stretcher could be made simply by stuffing grass into the canvas compartments. These, however, were not very popular. There were a number of German iron tube stretchers, also some of the same design as used in the French army. Most of the stretchers that were made of iron tubing, when subjected to rough and constant usage, became useless, for the legs or some other part would give way, and it was impossible to repair them in the absence of skilled workmen, whereas if a leg were knocked off of one of the wooden stretchers it could be easily replaced.

There were also some very good English stretchers that resembled those of our Army. They consisted of canvas braced over two wooden side supports which folded together by means of small metal cross pieces. Metal stirrup legs attached to the side pieces served to keep the stretcher off the ground. These stretchers were light, strong, not expensive, could be packed and transported readily, and made very comfortable beds.

When a wounded man is placed on a stretcher at the front, the stretcher becomes his permanent bed, so then it is important to not only look upon a stretcher as a contrivance for the temporary resting place of a disabled soldier during transportation, but to also bear in mind it becomes his permanent bed for probably several days.

It took four men to carry one man any distance on a stretcher. A favorite method used by the Russians was for these four men to carry the stretcher on their shoulders, two men at each end. The Russians had no regular stretcher drill and carried the stretcher as they pleased. Sometimes Chinamen were employed to carry the wounded after a fight; usually, however, the wounded man's comrades were always on hand when men were needed to carry a stretcher to the rear. Positions were often very much weakened by allowing men to do this. It would have been better to have left the wounded where they were until the men regularly detailed for their removal arrived.

When two men carried a stretcher they often made use of canvas supports over the shoulders to the handles of the stretcher. In the cities and in places where the streets were good the stretchers containing the sick and wounded were placed on small two-wheeled handcarts. These carts were provided with springs and could be manipulated by two men, and when the roads were smooth answered a very good purpose. Over rough roads the jolting a sick man received made him wish he were being carried on a stretcher.

At some of the evacuation hospitals there were some French stretchers on two wheels. This stretcher was made of metal tubing, and the wheels were similar to those of bicycles and provided with rubber tires. One man could push one of these stretchers without assistance. They were comfortable when new, but were too frail to stand any hard work.

In Port Arthur there was a volunteer bicycle stretcher corps. Two bicycles were used for each stretcher, one on a side. The one objection to this method of transportation was that too much room was taken up. Where there was sufficient space, this was considered the best scheme for carrying the wounded. In Port Arthur use was also made of rickshaws. The tops of these were removed and a small platform built, on which could be placed a stretcher. As rickshaws are strong and narrow and provided with springs, they answered the purpose very well.

Improvised stretchers were made at times from limbs of trees. A favorite and very practical temporary stretcher was also made by taking four guns and a soldier's overcoat. The guns were lashed together in pairs, the overcoat buttoned over them, and a fairly comfortable stretcher was ready for use.

During and after engagements the field hospitals were congested by large numbers of wounded. The wounds of the men were dressed, they were given nourishment, and as many as possible were put under shelter until they could be moved to the base hospitals by the sanitary trains.

During the days immediately succeeding the different fights the personnel of all these hospitals were utterly exhausted by the amount of work they were called upon to do.

When no engagement was imminent, these field hospitals were placed with their divisions in central locations and the sick were transferred to them. So the personnel of the hospitals were generally busy.

### CHARACTER OF CASES IN FIELD HOSPITALS.

In the different tents could usually be found the ordinary cases of sickness that occur among any body of men, such as rheumatism, gastritis, dysentery, typhoid fever, surgical cases, such as fractures—in fact, most of the ordinary ailments.

Field hospital No. 44 was with the troops from the beginning of the war, and retreated with them after each conflict when it became necessary. The chief surgeon and assistants in this hospital were all excellent surgeons. When there was no fighting, this hospital was used as a surgical hospital for treatment of such surgical cases as should develop in its vicinity. Toward the end of the war this hospital was established in a brick barrack building at Gunchulin. A good operating room was fixed up in one of the rooms; a second room was used for dressing cases. There were two large wards, one for officers and the other for soldiers, both fitted up with beds.

Among the cases in the wards in July, 1905, was a case of strangulated inguinal hernia, in which 6 inches of small intestine had been resected. The surgeon performing this operation had an assistant compress the lumen of the intestine with his fingers. He did not like instruments for this purpose. The gangrenous gut was resected from the mesentery, the bleeding points ligated with fine silk, and the mesentery folded and held in position by a couple of sutures. The anastomosis of the intestine was performed by the end-to-end method, using two rows of Lembert sutures. The parts were washed off with a salt solution and returned to the abdominal cavity. A modified Kocher operation for radical cure completed the operation. The man made an uneventful recovery.

A second case was one in which a small bullet had penetrated the abdomen, resulting in the formation of a gastric and a sigmoid fistula. No operative treatment was employed. The sigmoid fistula closed in two months and the gastric in three months.

Two cases of suppurative appendicitis had undergone operation and were convalescing. In almost every large hospital there was a case or two of this disease.

There were also two interesting nerve cases treated in this hospital. The first was a bayonet wound of the arm, severing the musculo-spiral nerve. The man was operated upon eighteen hours after receipt of the injury. The ends of the nerve were exposed and approximated by two fine silk ligatures.

Three weeks after operation some motion had returned to the muscles involved, and in three months the arm was quite strong.

The second case was also a bayonet wound. In this case the ulnar nerve was severed at the juncture of the lower and middle thirds of the forearm. This case was operated upon in the same manner. A primary union followed, but the case was lost sight of by reason of transfer.

A Japanese officer was under treatment for a perforating gunshot wound of the abdomen, which had involved his stomach. He had been wounded eight days previously. At the time of injury his stomach was empty. He vomited some blood at first, but this soon ceased. He had no fever or complications; the entrance and exit wounds were both healed. This officer stated that he had been shot at a distance of about 200 yards. His companions had applied a first-aid dressing to his wounds, shortly after which he had been captured. This officer was transported by stretchers for a distance of about 20 miles, and by the De Cauville Railway lines 30 miles farther. This was then a case of abdominal perforation with injury to stomach that recovered despite the fact that he was transported a long distance shortly after injury.

There were two cases of injury to hands by accidental discharging of rifles. Both men were removing the bayonets from their guns when injured. The first man was shot through the hand, and it was necessary to amputate through the wrist joint. The second man had three fingers literally blown off by the force of the bullet.

There were several cases of fracture of the legs and clavicles under treatment. These men had mostly been injured by falling off horses. The fracture cases in this hospital were treated with plaster of Paris splints neatly applied. If a case were to be transferred, the diagnosis of the fracture and treatment to be followed were painted on the plaster splint, so if the papers in the case were lost the character of the fracture, etc., was immediately available for the medical officer who took charge of the case.

The surgeons in this hospital during the course of the war had operated upon a number of aneurism cases produced by small bullets. The operation performed was simply a resection of the aneurismal sac, leaving the vein, if possible.

On September 10, 1905, a soldier was admitted who had been shot fourteen days previously through the left forearm at the junction of the lower and middle thirds by a small bullet. The parts were tense, discolored, and presented signs of an increasing hæmatoma. An incision exposed the radial artery, which was found severed and

bleeding. This was ligated and the wound sewed up. The man had scurvy, and the doctors were of the opinion that the hemorrhage occurring so long after the injury was due to this fact.

It was a rule in this hospital to operate upon all head cases produced by small bullets or other missiles.

In the opinion of the surgeon in charge wounds produced by small bullets under 200 meters were usually fatal. In clean perforations the prognosis was favorable if the man survived for several days. If the exit wound was larger than the entrance wound, the prognosis was usually unfavorable.

If the dura is not exposed, and the parts drained at both the entrance and exit wounds, this surgeon believes trouble will follow the formation of the dural cicatrix.

A large number of abdominal perforations from small bullets have been treated in this hospital. After engagements it was necessary, of course, to transfer these cases toward the base hospitals, and they were lost sight of.

A number of cases of chest perforation have passed through this hospital. Very few presented any symptoms, even if the ribs were involved. Most of these cases returned to duty.

Suppurative wounds involving the kneejoint were treated by opening the joint freely anteriorly through the ligamentum patella, all débris was removed, the joint flushed out with salt solution, and through and through drainage established. The patella tendon was brought together with three stitches, and the operation was completed.

During the winter of 1904 two cases of hospital gangrene, each following a compound fracture of the ankle joint, were admitted to this hospital. In both cases there was a gangrenous process attended by gaseous formation, which spread up the leg. Amputation of the thigh was performed in each case without success.

The description of the above cases is only a small part of the interesting cases treated in field hospital No. 44. Many of the other field hospitals were doing similar work.

Situated close by field hospital No. 44 was field hospital No. 83 and the St. George I. Hospital of the Red Cross. Both of these hospitals were placed in barrack buildings, and were detailed for treating typhoid and dysentery cases toward the end of the war.

The typhoid cases were often admitted to these hospitals in the second and third week of the disease. It was of a severe type. The percentage of deaths was from 18 to 20. Stretcher beds placed on the floor, on which straw mattresses had been placed, were used for beds. The doctors and Sisters in these hospitals were untiring in their attentions.

The typhoid patients were given liquid diet, usually bouillon or chicken soup, during the febrile period. Soft diet, eggs, rice, and chicken, were given after the temperature had remained normal for a week. The cases were treated symptomatically, sponged when the fever was high, and, when delirious, ice bags were applied to the head.

A number of the cases were complicated by scurvy, which manifested itself by bleeding gums, petechial hemorrhages, effusions of blood into the joints, principally the ankles and knees. One case presented some petechial blotches on his nose. Hemorrhages from the bowels in these cases were frequent, but were usually controlled by the

lication of ice bags to the abdomen and the administration of )tine and morphine internally.

'he doctor stated that the percentage of mortality in these cases ; about the same as in the cases not complicated with scurvy.

ι number of typhoid cases were complicated by parotitis. This s probably due to infection from the mouth, as mouth washes were dom used.

The bedding and clothing of the typhoid patients were changed at st twice a week, and in many cases oftener. The sisters rarely con- ıcted the disease, because they understood the importance of hand sinfection after handling cases. On the other hand, many of the nitats in the typhoid wards became infected because they were less reful.

The infected bedding in these hospitals was imperfectly sterilized y formalin and then given to the Chinese to wash.

The infected stools were disinfected with a carbolic-acid solution, nd lime was used about the water-closets. Here, too, the sanitary ieasures were lax.

At both of these hospitals there were several cases of typhoid that lied from perforations. The doctors did not look with favor upon )perative procedures in these cases. In some other hospitals, how- ever, surgeons had operated on cases in which perforations had occurred.

### HOSPITAL TENTS.

The hospital tent proper is a large tent made of strong linen duck suspended from a ridgepole; over this is a fly which extended well beyond the edge of the tent. At each end of the tent proper there is a canvas partition. In summer these tents are comparatively cool; in winter the inner tent is lined with felt as an additional protection against the cold. These tents are 33 feet long, 24 feet wide, and 15 feet high, and are designed to accommodate 20 beds, but if necessary 30 patients can be cared for.

Some of the doctors said that the tents were too high and heavy to handle. The high winds in winter made it necessary to brace the tents with wooden supports.

There were several small Le Fevre French tents in use that were preferred by some. These tents were lighter, not so high, were not affected by the wind as much as the larger tents, and could be transported and erected more easily.

For beds there were a number of schemes used. One was merely to place the stretchers on the ground; another was to construct a permanent bed by driving pieces of wood into the ground for supports for a mattress of woven twigs. A bed platform was sometimes built on two sides of the tents by merely piling up earth; on this the bedding was placed. Sometimes a layer of boards covered the earth, but not always. Bed platforms were also built by using branches of trees, which were driven into the ground on both sides of the tent so as to form, when bound together with other branches, two compartments about 3 feet high by 7 feet broad, running the length of the tent on each side. These spaces were filled with green twigs, which made a springy foundation for the straw mattress. The objection to this form of support was that when the twigs became dry they were very

inflammable, and several fires resulted from men dropping cigarettes or matches among them, so they were not very popular.

The bedding and blankets supplied for the sick were abundant and of good quality.

The doctors and sisters and other personnel occupied small tents and lived very comfortably.

### FIELD HOSPITALS.

The field hospitals often made use of buildings, or, when these were not available, mud houses were often pressed into service. These houses were usually well built, dry, and supplied with a large stove, water, and with several rooms that could be used for wards or for other purposes. The one drawback to the Chinese establishments was the dirt, fleas, and other small inhabitants that infested them, but they could be made habitable by a thorough cleansing.

An operating room was a prominent part of each field hospital. It was situated either in a tent or in a room of one of the buildings utilized by the hospital. If a room in a Chinese house was to be used for this purpose, it was first thoroughly cleansed, and if it was to be occupied for any length of time a cement floor was laid down; the walls and ceilings were then covered with muslin that had been treated with oil and painted white. This was held in place by strips of wood nailed to the walls. A room so prepared was light, clean, and afforded a good place to perform operations and dress cases.

The light in the rooms was obtained from large windows during the day, and at night oil lamps were used.

The water used in these operating rooms was always sterile. Sometimes it was filtered and boiled; at other times only boiled.

The instruments were packed in wooden cases, and these cases were packed in wooden boxes painted green. These boxes were about 2½ feet long, 2 feet high, and 2 feet in width and were strongly constructed. Most of the instruments were made in St. Petersburg in Government works. They were uniform in pattern, up to date, were made of good material, and compared favorably with the instruments found in the hospitals of our country. The instruments supplied were sufficient to perform almost any major operation.

In all there were 26 wooden cases for instruments, medicines, surgical apparatus, and dressings.

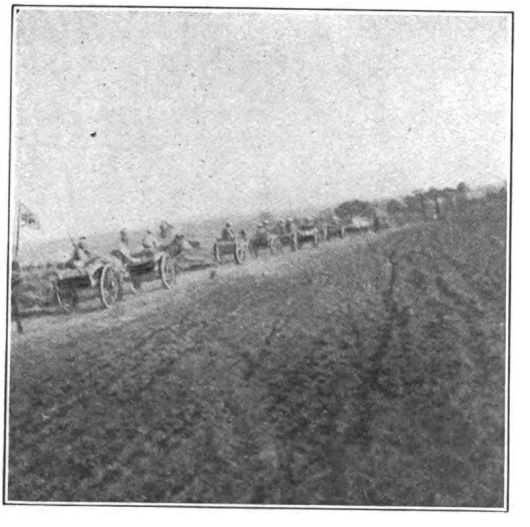
The medicines, of which there were 99 in the allowance list, were carried in bulk in glass bottles. These medicines are identical with ours and are designated by their Latin names.

Each hospital carried an abundant supply of sterile dressings, first-aid packets, gauze in large rolls, lint, cotton, absorbent wood cotton, and stout gauze bandages varying in width from 2 to 8 inches.

The hospitals endeavored to keep a full supply of dressings, etc., on hand constantly. Stores were replenished by filling requisitions from medical supply trains or from the medical storehouses in Harbin. If the need was urgent, a feldscher was dispatched with an order from the medical officer in command of the hospital to the supply depot, where he received the needed articles immediately; the approved requisition followed later.

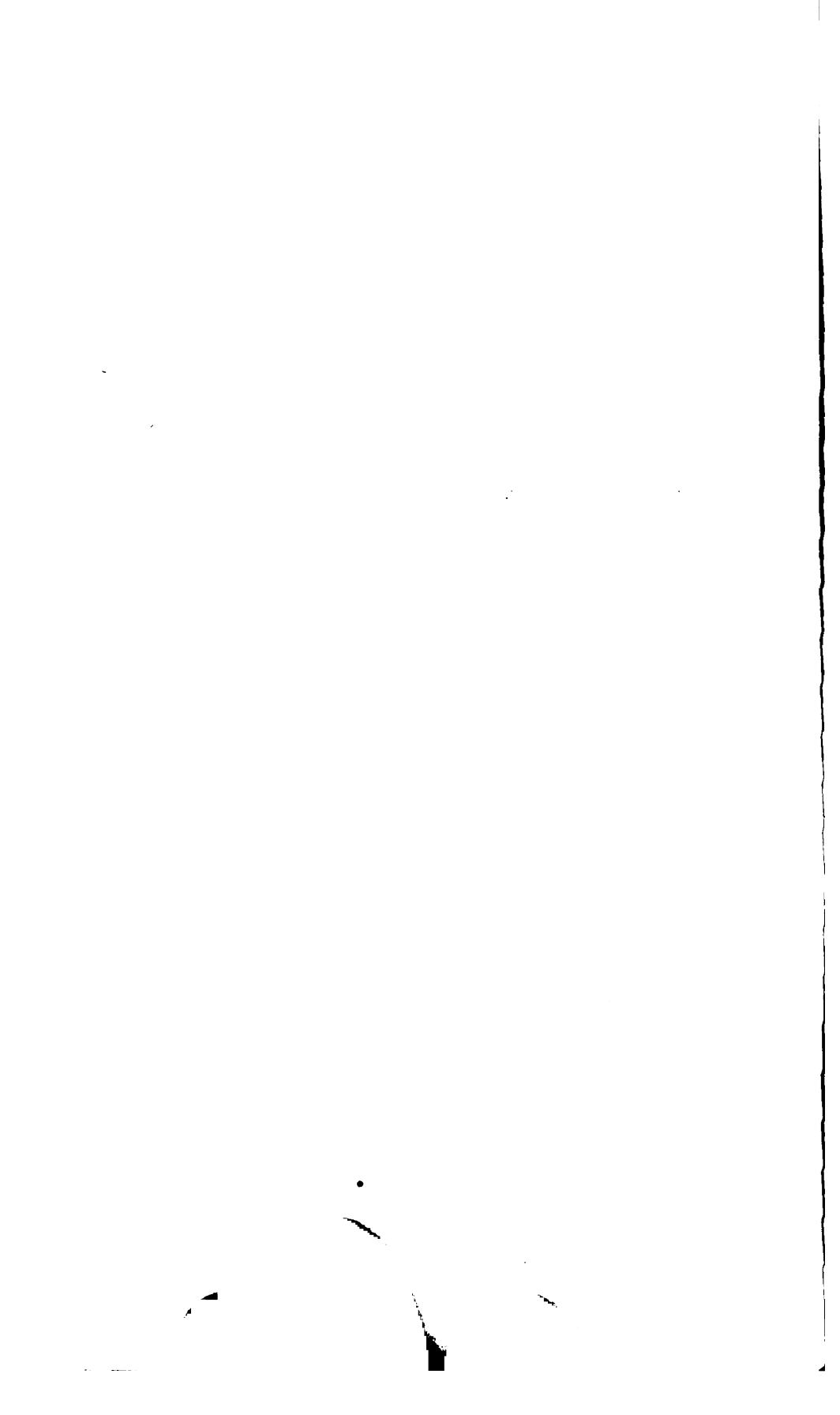
Use was made by the military department of Red Cross supplies. In the Red Cross supply depots were not only the ordinary medicines,

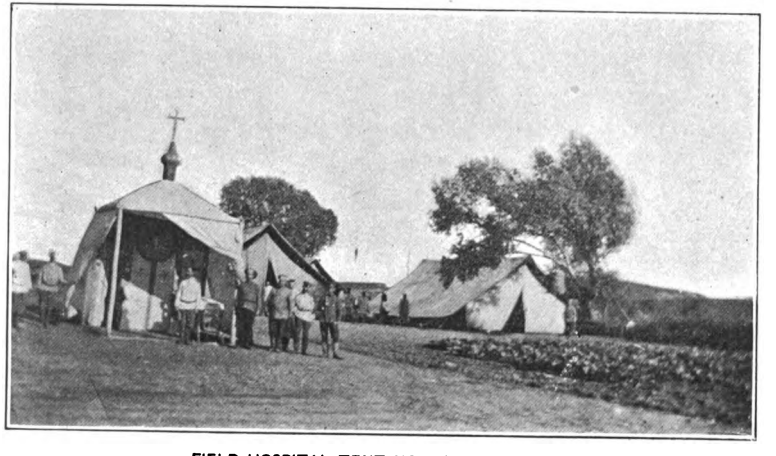
RUSSIAN FIELD HOSPITAL.



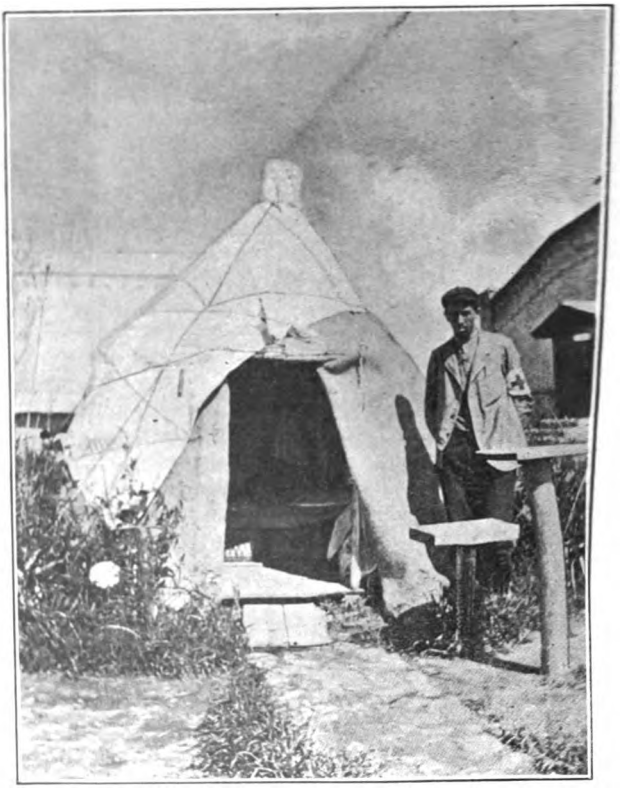
RUSSIAN FIELD HOSPITAL, UNDER WAY.

RUSSIAN FIELD HOSPITAL, HALTING.

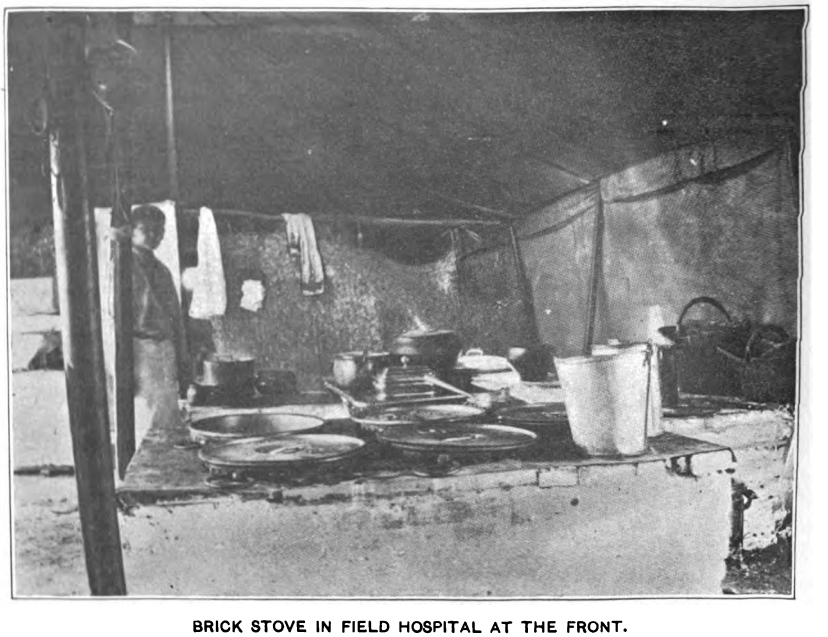




FIELD HOSPITAL TENT NO. 74, MANCHURIA.



DOCTOR'S TENT, RED CROSS HOSPITAL, GOTSEADAN.



BRICK STOVE IN FIELD HOSPITAL AT THE FRONT.

dressings, instruments, etc., but also a large assortment of medicines put up in tablet form. In fact, their supply depots in Harbin, Vladivostok, and elsewhere resembled large wholesale drug stores. In addition the Red Cross depots contained large quantities of woolen jerseys and clothing of all descriptions for the sick. Any of these could be obtained by either Red Cross or military hospitals simply on a written request by the medical officer in command.

The sterilizers used in the field hospitals for instruments are made of metal, are about 2 feet long, 14 inches broad, and 10 inches high. The sterilizers for the dressings, gowns, sheets, etc., are larger, stand upright, are cylindrical in shape, and air-tight. Steam was used in both, being generated from water in the bottom of the sterilizers, the heat being supplied by petroleum burners.

The sisters were directly in charge of the wards, took temperatures of the patients, served out the medicines, diets, etc., and one was usually detailed to look after the operating room.

Each medical officer had his special wards and looked after his own cases and acted as officer of the day in his regular turn.

The duties of the feldschers were those that correspond to the sergeants or hospital stewards in our Army. One was in charge of the dispensary and the others given duty in the operating room and wards. Feldschers were often intrusted with dressing simple cases. They also performed some of the clerical work.

In each field hospital there was a daily journal in which all admissions and discharges were recorded. Case papers recording all data, the history and treatment, with a temperature chart, were kept in each case. These case papers accompanied each man when he was transferred to another place. Weekly reports of the sick were sent to the statistical officer in Harbin and to the medical inspector-general of the army.

The system of papers used for patients was elaborate, but complete. If properly filed, it will be of great value in case of pensions.

In each tent there were usually two sanitats, or what correspond to our hospital-corps men, on duty. These men did all the heavy work, such as lifting the patients, keeping the wards clean, thereby helping the sisters a great deal.

In the military hospitals soldiers were detailed for this work, while in the Red Cross hospitals men were specially employed for this duty.

While in the wards of all the base hospitals and many of the field hospitals the doctors, nurses, and sanitats wore long white cotton gowns. This was an excellent idea, as it at once showed whether a person was on duty or not; and as the gowns were white, they necessarily were kept clean, and infected matter was kept off the clothes of the personnel when handling typhoid fever cases, dysenteries, and infected wounds. In most of the hospitals these gowns were disinfected before they were washed.

The diet of the sick and personnel at the front was practically the same as that of the soldiers—meat, soup, and black bread twice a day. When a hospital had established somewhat permanent quarters, stoves were built and arrangements made with the natives by which chickens and vegetables were obtained. In the outfit of each field hospital there was a certain amount of bouillon and canned provisions which could be used as occasion demanded.

The washing was generally performed by Chinamen, who were

either regularly employed as washermen or did each washing for a certain stipulated sum.

The sinks of some of the field hospitals were covered. Where the hospital had become permanent arrangements were made to cart the excreta away and bury it. A great many sinks, however, showed a lack of knowledge in construction and a lack of appreciation of the danger that was sure to follow neglect to bury and disinfect all possible infected matter. Trenches were often shallow and only screened by brush; no barrier prevented flies from accumulating and distributing the germs of typhoid and dysentery. Lime was used in some of these trenches at times, but spasmodically. The trenches were not treated with earth at regular intervals, they were not burned out, nor were they always filled up when abandoned.

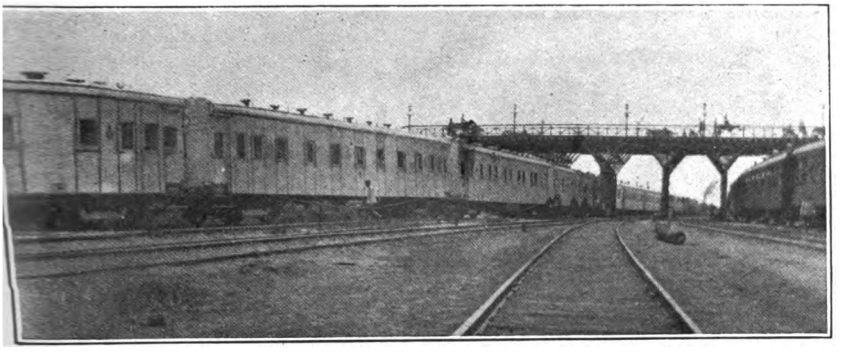
### SPECIAL RAILWAY HOSPITAL FACILITIES.

One of the best things the Russians had in their army equipment was large quantities of sections of small steel rails joined together with metal crosspieces. A bed for these rails could be rapidly made, and a railroad on a small scale was immediately available for the transportation of men and supplies. Small platform cars supplied with brakes were used for this purpose. There were also cars not unlike street cars in appearance. These were used for passengers and sometimes the sick. Toward the latter part of the war a regular hospital train was constructed on the line running from Hirsu, on the left wing of the army, to Gunchulin, which was on the railroad line. In each car there were two stretchers and a bench on which three or four men could sit. The cars were covered with white canvas; a red cross was painted on each side. One sanitat attended the brake on each car. A special car was provided for a doctor, two feldschers, and a sister; so medical attendants were constantly available. In winter stoves were placed in these cars.

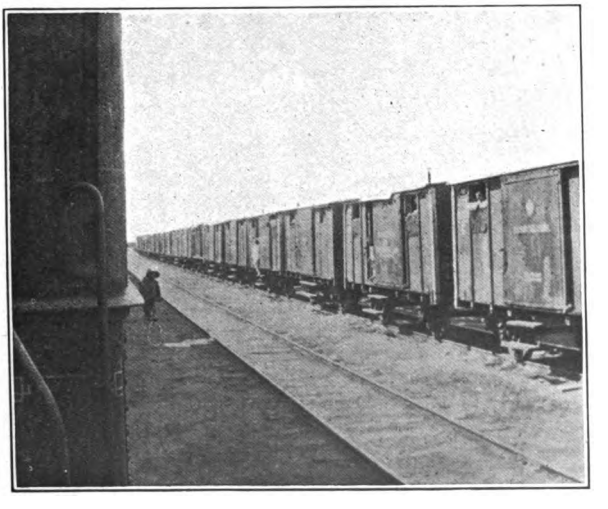
The Japanese captured large quantities of the De Cauville rails in Mukden, but the Russians still had enough to run two long lines, one to each flank of the positions they next occupied.

The line to the left flank was 30 miles long and ran part of the way over some steep grades. A regular hospital train was run daily from Hirsu to Gunchulin. At each end of the line there was a Red Cross hospital with about 450 beds in tents for receiving and evacuation purposes. Patients were brought from the field hospitals in the positions by transports, mostly by the two-wheeled carts, some from the positions in the mountains on stretchers placed between two mules, to the receiving hospital. Here they were fed and rested and then placed on the cars. The train started at 9.30 a. m. and did not arrive at its destination in Gunchulin until twelve hours later. Midway between these stations was a large etap station run by the Zemstvo Red Cross Society. Here the patients were given a rest and fed. The horses were also changed. When the train arrived in Gunchulin the patients were given bouillon and black or white bread.

The doctor on duty divided the sick into three classes. First, those that could walk; second, those that were to go in the small two-wheeled carts, and, thirdly, the very sick, who were to be carried on stretchers. All patients were transferred to the evacuation hospital. Here the doctors on duty determined their ultimate destination—

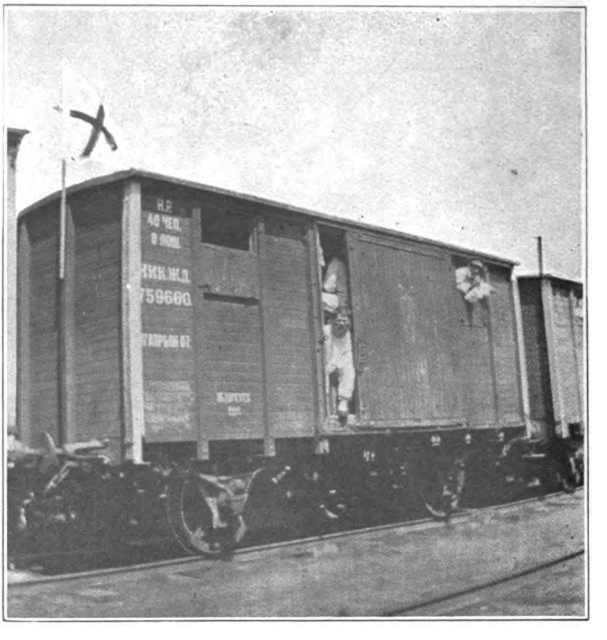


CZARINA'S HOSPITAL TRAIN.



HOSPITAL TRAIN OF COMMON CARS.

CAR FOR INSANE.



FREIGHT CARS, EQUIPPED FOR THE SICK.

ıether they were to remain in the hospitals near by or be transferred r the sanitary trains farther northward to the base hospitals, usually Harbin.

Each man received a certificate on which was written his name, ıte, diagnosis, and place to which he was to be sent.

A De Cauville line ran out to the right flank of the army in the same ıanner as it did to the left flank.

Field hospital No. 105 was situated at the Gunchulin end of the line nd acted as a receiving hospital. Patients were transferred from here to the evacuation hospital by transport No. 9, which was detailed or this duty.

Transportation of the sick and wounded by the De Cauville railway over rough or muddy country as used by the Russians was the nethod "par excellence." The journey was accomplished more ıuickly than it could have been in ambulances, there was comparatively little jolting, the patients could be fed and looked after on the way by regular hospitals, and at the end of the journey the sick were not completely exhausted, as so often was the case after a long ride in an ambulance.

The evacuation hospitals were established with the idea of getting patients together, making a record of each case, confirming diagnoses, and distributing them intelligently to the hospitals near by or sending them by sanitary trains to hospitals suited for the treatment of the individual case.

After the retreat from the battle of Mukden, at Gunchulin, which was about 25 miles in the rear of the positions, was situated the first of these hospitals. At this hospital there was a so-called evacuation commission, which consisted of 5 medical and 5 line officers. The colonel of the line was in command.

In addition to these there were 5 assistant surgeons, 20 feldschers, 6 sisters, 200 sanitats or stretcher bearers.

It was the duty of the evacuation commission to determine the destination of the sick and wounded that passed through the hospital. They were kept informed of the vacant beds in each hospital in the vicinity and distributed cases that were likely to recover in a short time to the hospitals close at hand. Very serious cases, that could not safely be transported, were also sent to these hospitals. It was the aim of this commission to keep the hospitals near the front empty and ready for treating the wounded that would naturally follow an engagement.

Many convalescents not strong enough to do duty were sent from the hospitals near the front farther toward the rear to recuperate before returning to duty. The headquarters of the evacuation hospital in Gunchulin was in a brick building situated about one-half mile from the station. Around this building, which contained several wards, a small dispensary, and operating room, were pitched twelve large hospital tents.

Toward the latter part of the war two Christoph Unmack portable paper houses were put in use for the reception of patients. This was veritably a busy place, for all the disabled from the right and left flanks of the army were brought here by the De Cauville railroad, and all the sick of the troops located in the vicinity of Gunchulin were distributed from this point. From three to eight hundred patients passed through this hospital daily.

Patients were kept here but a short time; they were fed, tickets were made out, and those that could walk proceeded to the station. The very weak and sick were carried on stretchers to the hospital trains.

The closets at this hospital were covered and the excreta was caught in wooden receptacles and removed. Disinfective measures other than that of using lime were not much used.

In Harbin the evacuation commission occupied quarters in a separate building. Here the same duties were performed, only on a much larger scale.

One large hospital, occupying several large stone barrack buildings, situated on the railroad a mile from the station, was kept empty and ready for emergency. In this hospital there were 600 beds. After the battle of Mukden cars of all descriptions discharged several thousands wounded here for temporary treatment.

For receiving patients from the trains a long platform was built, so as to be on a level with the bottom of the cars. The hospital trains discharged their patients here; they were then carried to the wards of the hospital and as soon as possible sent to one of the regular military or Red Cross hospitals. For this purpose small railways were laid down from this point to the hospital town. The cars which bore the sick and wounded were pushed by hand until the latter part of the war, when a small steam engine was put in use.

Many times cases were kept in this hospital for several days in order to determine their exact nature, and when a diagnosis was arrived at the cases were disposed of correctly.

This hospital, then, was nothing more than a receiving ward for the other hospitals. Cases were also brought here from the hospitals in Harbin to be sent westward in hospital trains.

The medical and nursing staffs were kept intact, ready to be of immediate service in handling and caring for the wounded after any engagement that might occur.

A second evacuation hospital adjoined the station proper in Harbin. Here the sanitary trains from the south brought all the sick and wounded when there was no rush, and from here the sanitary trains to the westward toward Tchita and Irkutsk were loaded and dispatched.

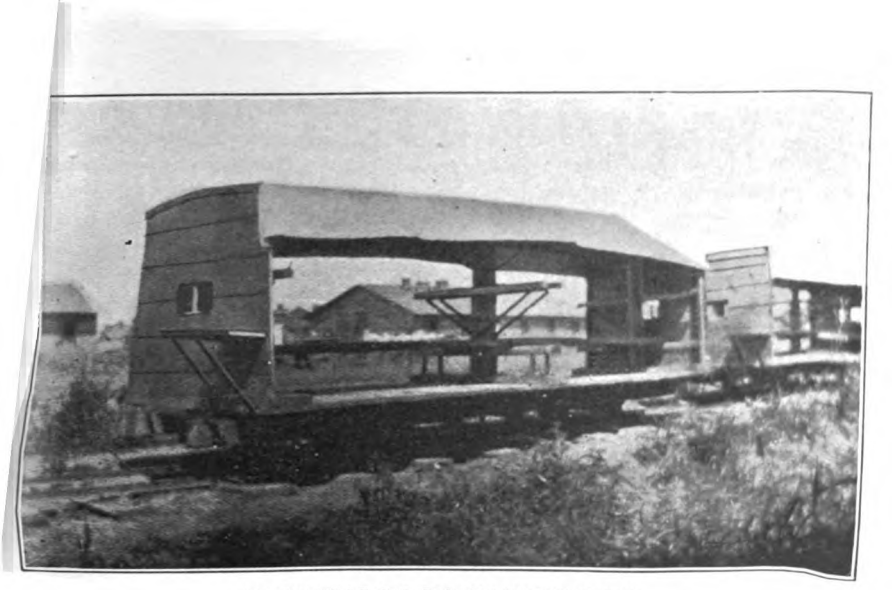
In this hospital, if such it can be called, there were temporary resting places for about 400 men. While here patients were fed and were then sent to the hospitals in Harbin by means of ambulances, on stretchers, or in two-wheeled hand carts. This evacuation point had telephonic communication with all hospitals, both military and Red Cross, and so was kept constantly informed of the exact location of the empty beds and would act accordingly in the distribution of patients.

Some patients were brought direct to the military hospitals on the outskirts of Harbin by the sanitary trains without going through the evacuation point. A record of these was given to the evacuation committee from the hospital later.

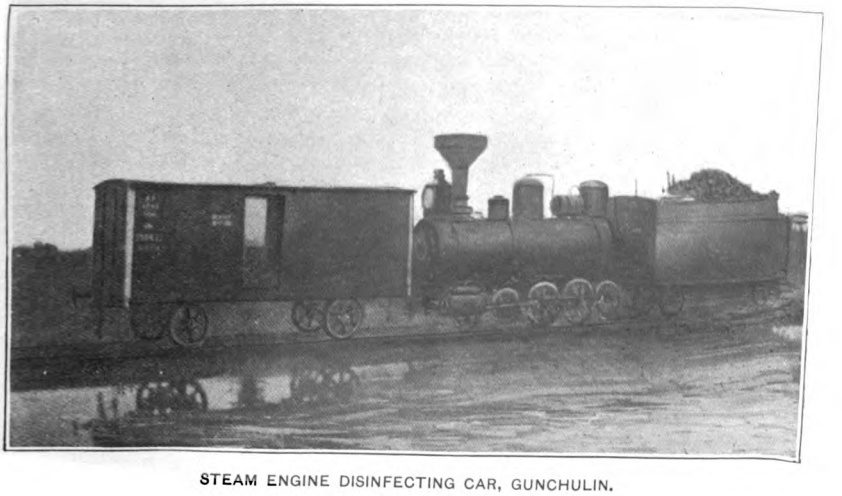
All convalescents that returned to duty also passed through this evacuation point.

An idea of the amount of work performed at this place can be formed when it is stated that from 1,000 to 2,000 cases were attended to daily. Doctors and nurses were continually on duty day and night.

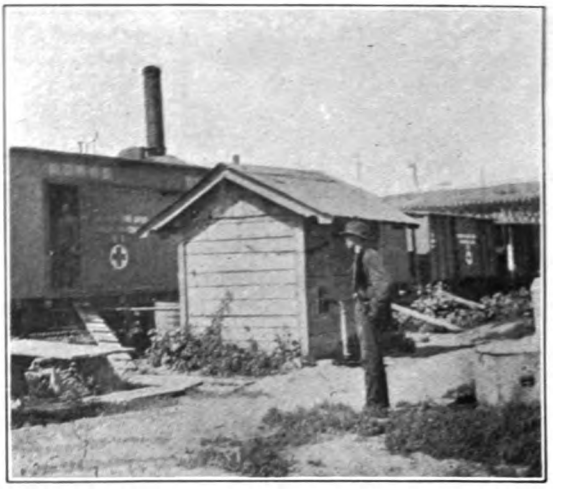
At Irkutsk there was another large evacuation point run on the same principles.



DE CAUVILLE CAR FOR TRANSPORTING SICK.



STEAM ENGINE DISINFECTING CAR, GUNCHULIN.



ICE CAR, HARBIN.

TAKING PATIENTS ON A HOSPITAL TRAIN AT THE FRONT.

At all military stations near the front there were rest stations established for sick soldiers. Here doctors and sisters were continually on duty, and the sick were attended to, dressings reapplied, if necessary, etc.

### MILITARY AND RED CROSS SANITARY TRAINS.

At the end of the war, according to the statistical officer, there were in service the following military sanitary trains:

| | |
|---|---|
| In field of operation | 12 |
| In the rear of the army | 17 |
| In the Pre Amour district | 6 |
| Temporary trains | 36 |
| Total | 71 |

In addition to these there were 23 Red Cross sanitary trains operating in Manchuria and on the trans-Siberian railway.

The hospital trains were of three varieties. The first included the most luxurious; the cars were pure white with red crosses painted on the sides. In all there were four of these trains, one supported and named after the Czarina, the Dowager Empress, the Czarevitch, and Princess Yusupuff.

Each train consisted of about 20 large white cars, larger, broader, and higher than our Pullman cars, and presented a striking appearance as it moved about on the railroad. The internal appearance was in keeping with the spotless enameled white of the exterior. There were cars for the sick officers and cars for the soldiers; in all, on one of these trains, about 250 men could be accommodated with berths.

For receiving stretcher patients on the hospital trains the ends of many of the cars were fixed so that they could be opened on iron pivots. This was an excellent arrangement, for sometimes in cars not so provided considerable difficulty was experienced in taking on board stretcher cases.

There were in use generally two systems of beds; one was the Kruger system, which consisted of wooden frames which could be folded to the sides of the car. On these supports were fastened strong steel springs, which supported the ends of the ordinary canvas stretchers that were used as beds. The stretchers could be lifted on or off the supports at will, so a case that required a dressing could be carried into the dressing room without disturbance.

The canvas on these stretchers could be removed, disinfected, and washed when necessary.

With the second system metal tubing and iron springs were used. Two tiers of berths were arranged on each side of the car. In one car there would be placed 18 of these bunks. The cots proper were made of metal tubing and strong wire springs. These cots could be taken out and slid back into position by means of small wooden wheels which ran in metal grooves. They were secured into position by means of straps; wooden handles fitted into the ends of the tubing, and when these were drawn out the cot could be used as a stretcher. The doctors preferred these metal cots and springs, as they were easier to keep clean and took up less room than the canvas cots and patients did not sag down, quite an important point when fractures of the lower extremities were being treated.

Mattresses and pillows with clean linen were provided for all the beds, as were also warm blankets, nightshirts, drawers, socks, slippers, and long coats made of warm cloth in winter and linen in summer.

These cars were fitted with electric buttons for each berth. Electric fans, electric light shaded by blue glass, porcelain washstands, and bath tubs. Mosquito nets were suspended in such a manner that they could be dropped over both tiers of berths.

On each train was an operating room. These rooms were fitted up with modern iron operating tables and all the accessories found in the operating room of a modern hospital. In some of these the floors were tiled. Adjoining the operating room proper was a room utilized for dressing cases and sterilizing dressings. The sterilizers contained large chambers, and dressings were disinfected by steam generated from water by use of a petroleum flame.

The instruments were contained in two wooden cases about 18 by 12 by 6 inches. They were modern and well made.

Metal sterilizers for the instruments were packed in the cases, and formed an inside case for the instruments.

These hospital trains were really moving hospitals. In addition to the operating room there was a well-stocked dispensary, presided over by a graduate female nurse, who dispensed the medicines.

There was always a car for the medical personnel of the train, in which a comfortable dining room was situated; also one for the kitchen, in charge of which were Chinese cooks.

Provisions, ice, extra bedding, etc., were carried in cars attached to the hospital train proper. The whole arrangement was most complete. Nothing was lacking that money could supply.

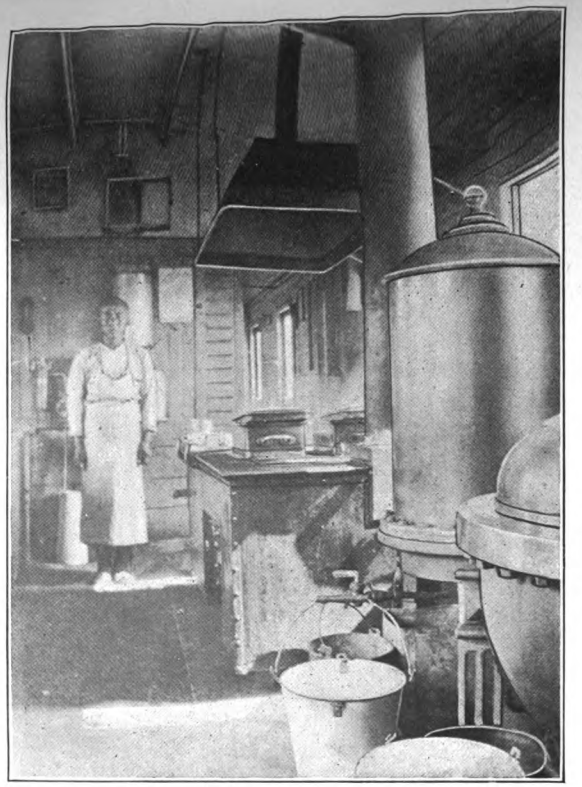
In charge of these trains was a Red Cross official, who acted as the commandant. The medical personnel consisted of from 2 to 4 doctors and usually 8 to 12 sisters, several feldschers, and a variable number of sanitats, usually 2 to a car.

The second and principal class of hospital trains were not fitted up so luxuriously as the white ones. The cars in these trains were the same size, but were painted green. Red crosses were prominent on the sides of these wagons. These trains carried from 300 to 500 men. For the very sick the same Kruger system of supporting stretchers, and in some of the cars the cots made of metal tubing, were in use.

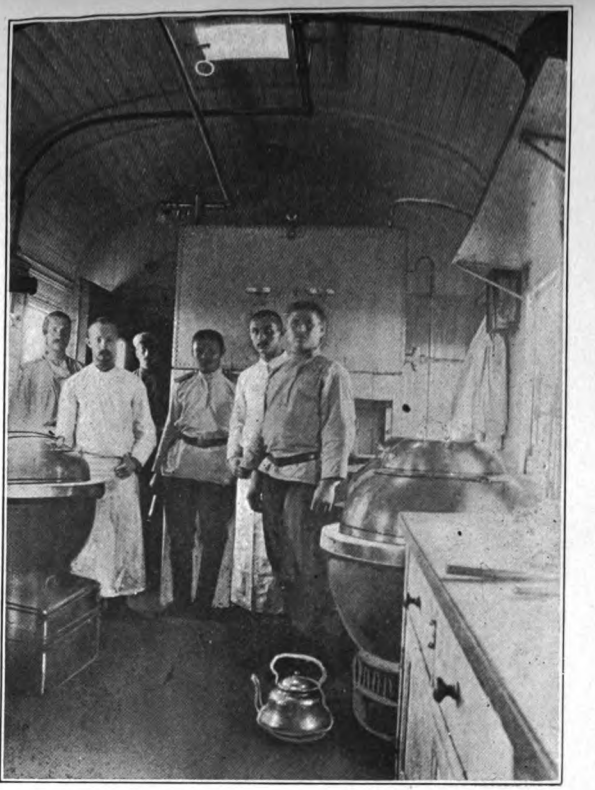
Another very practical method of securing stretchers was by the use of wooden crosspieces from which ropes were suspended. The stretchers were fastened to these ropes in two tiers on each side of the car. The wooden crosspieces gave spring enough to diminish a great deal of jolting when the train was in motion.

The use of these stretchers and metal cots supplied more ventilation and took up less room than permanent wooden berths would have done.

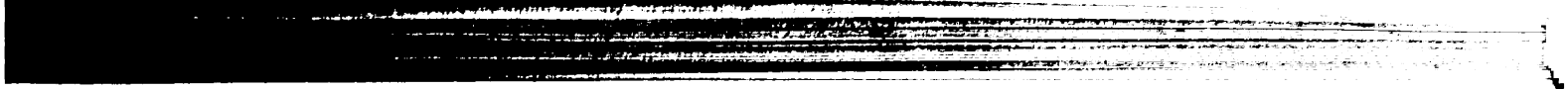
For patients that were not very sick, but still disabled, use was made of the ordinary third-class coaches. The berths in these cars were merely wooden platforms, and they were arranged in three tiers in compartments, with a free air space at the top. Mattresses and pillows filled with straw were placed on these wooden supports, and the patient was made secure by a little flap of canvas that was raised on the open side and secured by ropes. One of these cars could hold 50 cases comfortably.



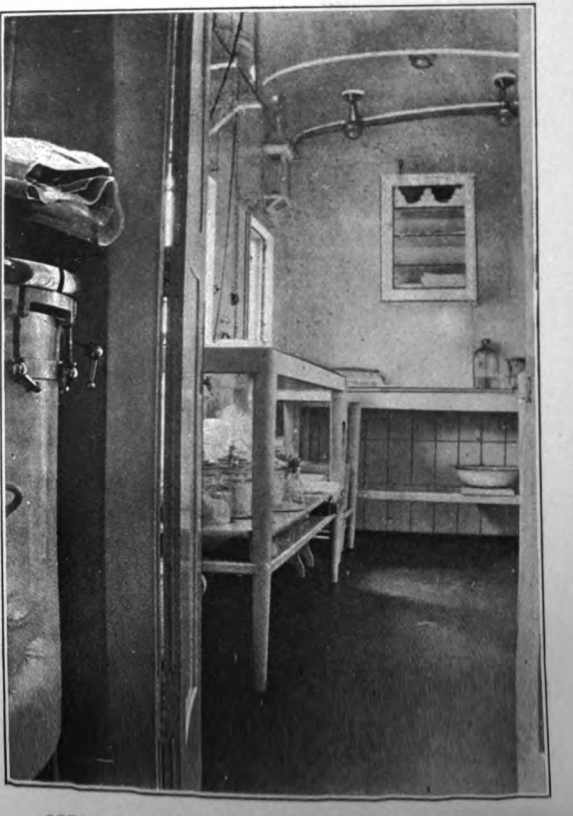
KITCHEN, CZARINA'S HOSPITAL TRAIN.



KITCHEN, CZARINA'S TRAIN.



KITCHEN, HOSPITAL TRAIN.



OPERATING AND STERILIZING ROOM, NOBILITY TRAIN.

Plain freight cars were fitted up for transporting sick and wounded by building in sleeping platforms, two at each end, running across the car. The cars were lined with felt, and boards nailed over this for warmth in winter. A stove in the center, with a stovepipe protruding from the top of the car, furnished heat, and made the occupants happy in the coldest weather.

These freight cars are similar in design to ours, but larger, and are supplied usually with 4 small windows, one at each end on the sides. From 16 to 20 patients were carried in each car. These cars were also used to carry troops, and were designed to accommodate 40 men or 8 horses.

All hospital trains were fully equipped as regarded operating rooms, dispensary, kitchens, provisions, cars, etc.

All military hospital trains are under a line officer, who was called a commandant. Usually there were 2 or 3 doctors on each train, several feldschers, about 6 to 10 sisters, and 2 sanitats for each car, sometimes more.

When making the rounds and on duty, the doctors, sisters, and sanitats wore white cotton gowns similar to those worn in our operating rooms.

Patients on the regular hospital trains received most excellent and careful treatment.

On these trains there were a number of emergency operations performed when the trains were blocked after a fight and the patients could not be placed in hospitals. As a rule, however, no operating was done other than emergency work.

On the Czarina's train one abdominal section was performed in a case of a bayonet wound. Three perforations of the intestines were repaired. The man was transferred and lost sight of.

Five operations were performed on the skull for bullet wounds of the head, and several small operations completed the list.

When stretcher patients were placed on the sanitary trains, they left behind them their clothing, or if they did not do this they were given undershirts and drawers and put in bed. A supply of these garments formed a part of the outfit of each train.

In addition to the bedding carried in the hospital trains, proper bedding and clothing were kept in supply cars at points where the hospital trains were made up. This was more particularly true where the freight cars were used to send patients back from the front.

All the cars were washed out and disinfectd by formalin after each run. The bedding and clothing was sent to the wash and replaced by clean garments.

These hospital trains were remarkably free from odor, and clean, considering the work they were engaged in.

The Bodkin laboratory and disinfecting plant consisted of one train and three stations—one in Gunchulin, one in Tchita, and one in Vladivostok. This train and stations were supported by the Red Cross, the Moscow Therapeutical Society, and the Grand Duchess Elizabeth. The running expenses amounted to about $2,500 a month.

The train consisted of several cars—one for storage, one fixed with a steam disinfecting plant, and one fixed up as a modern laboratory. Clothes and bedding from the hospital trains were disinfected in the disinfecting car. The work in the laboratory consisted principally in

performing Widal reactions and in examining specimens of water. This train did good and efficient scientific work.

The royalty supported a separate operating train, which was kept on the railroad near the front. The operating room in this train was all tiled, the furniture and instruments were most modern, a special surgeon and trained nurses formed the medical personnel. Large quantities of surgical supplies were kept in cars attached to this train.

In all there were 16 ice cars in use in various places. These became stationary while making the ice. The ammonia process was the one used. During the winter ice was placed in earth houses along the railroads and in the cities, but the supply gave out and had to be supplemented by artificial ice.

In Gunchulin a permanent ice plant was built, but the ice here was too far away to be shipped to the places where it was needed.

Great credit is due Russia for the manner in which the sick and wounded were handled on the single-track railroads. After battles there was of course some confusion. After Mukden, for instance, it took fifteen days to remove all the wounded to the base hospitals, but, considering the number that had to be handled and the circumstances, it was accomplished quickly.

In no other country are there such long distances to travel by railroad as in Siberia and Russia, so in the natural course of events a most excellent organization of hospital trains was evolved. The whole system worked smoothly and most efficiently.

### MOVABLE RAILROAD HOSPITALS.

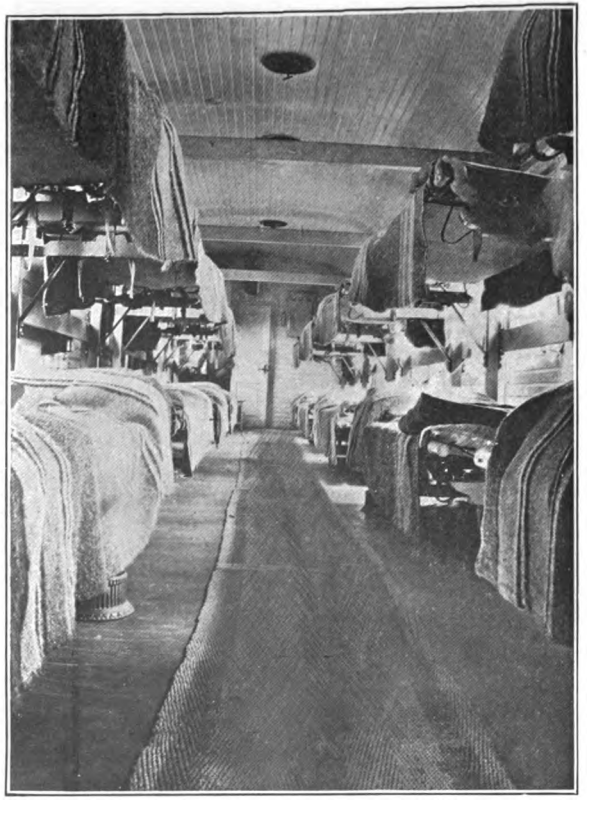
Along the railroad lines were situated what might be termed movable railroad hospitals. These hospitals belonged, as a rule, to the Red Cross Society and were placed directly on the railroad lines and depended on the railroad for transportation if a change of site became necessary.

A good example of this class of hospitals was the Kraesto Vosedrishensky, supported by the Empress and in charge of Doctor Butz, of St. Petersburg. This hospital was organized at the beginning of the war and was near the front in all engagements. In all it occupied five different localities. It was equipped to treat 300 bed cases, and was supplied with a number of tents, beds, bedding, instruments, medicines, 4 doctors, 10 sisters, sanitats, and cooks.

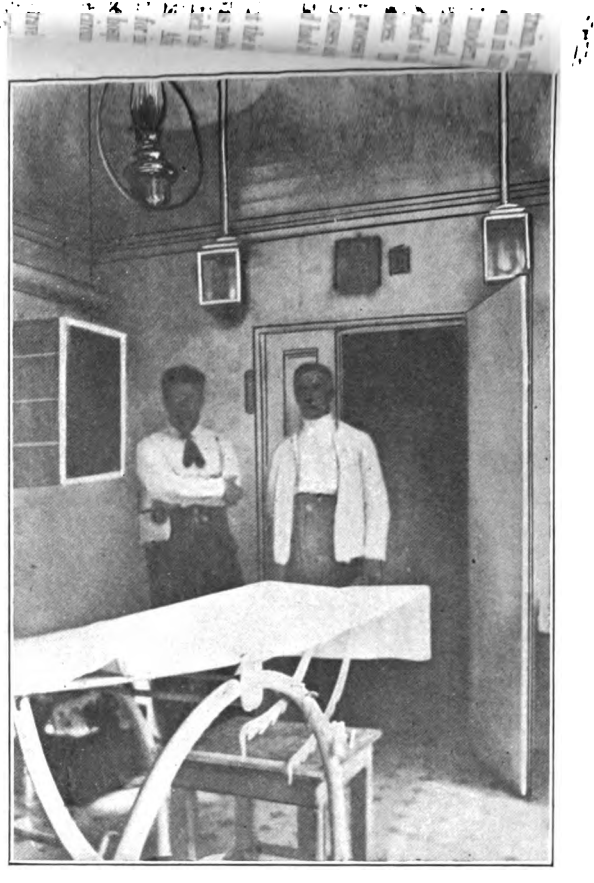
As there were no wagons or horses to look after there was not as many sanitats as there were in the field hospitals.

Use was made by this hospital of barrack buildings and Chinese houses in different places. In Mukden it was situated in the Buddhist temple, so while here it was not necessary to make use of the tents.

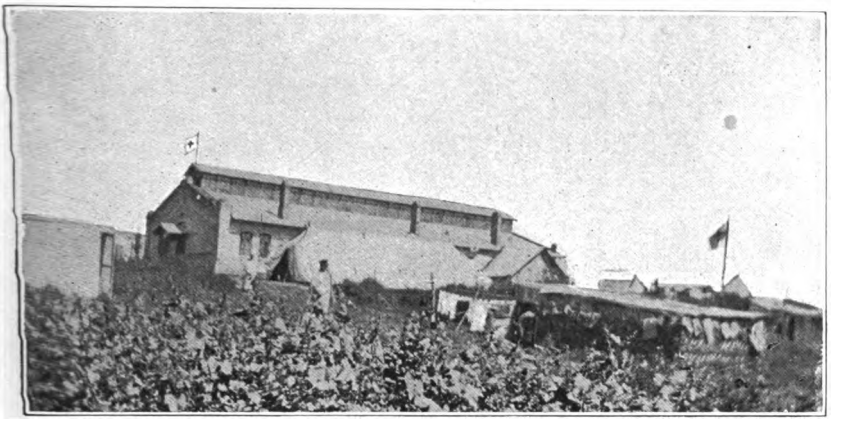
During the battle of Mukden this hospital remained in the city of Mukden, and, as it was impossible to remove the sick and wounded during the retreat, Doctor Butz and staff remained behind with their patients and fell into the hands of the Japanese. During the four hours' interim between the evacuation of the Russians and entrance of the Japanese attempts to loot the hospital was made by some Chinese, but they were driven off by the use of rifles that were kept in the hospital for just such emergencies. This hospital remained in Mukden three weeks after the evacuation. The Japanese allowed the staff to return to the Russian lines.



KRUGER SYSTEM IN RUSSIAN HOSPITAL CAR.



NOBILITY OPERATING TRAIN. GOTSEADAN.



DOCTOR BUTZ'S RED CROSS HOSPITAL, GOTSEADAN.

DOCTOR BUTZ (ON THE LEFT).

RUSSIAN CHURCH CAR.

NOBILITY OPERATING TRAIN, GOTBEADAN. LOOKING INTO OPERATING ROOM.

The last place occupied by this hospital was at Gotsiadan, close to he headquarters of General Linevitch. All the beds and much of the quipment had been left behind in Mukden, so use was made of stretchrs for beds. The main was placed in a large brick barrack building; he hospital and other tents were clustered about this as a central point.

The sisters lived in small felt tents made after the manner of those of he Baikal region.

In addition to one of the ordinary movable kitchens, where soup ould be cooked for 400 men if necessary, there were in use brick ovens and a modern gasoline stove, so that it was possible to cook almost anything.

The garbage box was closed by a lid. The closets were covered by straw matting, and provisions made by means of wooden boxes and a cart for the regular removal of excreta. Lime was also in evidence about these closets.

The water was obtained from a well, and boiled before use.

An operating room was fitted up in one of the rooms of the barrack. The walls and ceiling were lined with linen duck, painted white. The floor was cement. Movable sterilizers were in use. Four operating tables gave quite a business-like appearance. The doctors and nurses wore white gowns during operations. Our methods of hand disinfection were used.

Neither in this hospital, nor in almost all other hospitals, were rubber gloves in use. The Russian doctors prefer, as a rule, the uncovered hands when operating, objecting to the use of gloves as interfering with the delicacy of touch. Prof. Zoge Maunteuffel, of the University of Dorport, who operated in the personal hospital of the Empress Dowager in Gunchulin, was a firm believer in the use of rubber gloves in all surgical procedures. Rubber gloves were also used by the German doctors in the German Red Cross hospital in Harbin. Professor Maunteuffel advocates for use at the dressing stations sterile rubber gloves put up separately in small linen bags, so constructed that uncleansed hands can be placed inside the gloves without coming in contact with its sterile exterior.

The use of sterile gloves at dressing stations and in field hospitals would be a decided step toward the rational and proper treatment of wounds in warfare. Boiling water or a bichloride of mercury solution is always attainable at these points. Here it is, during an action, that the doctors and nurses are taxed to their utmost in dressing wounds. We all know that here a certain proportion of cases are infected. Why not, then, when we can so easily do so by the use of gloves, handle the wounds aseptically? When a hand comes in contact with an infected bone case, it takes time to effect a thorough mechanical and chemical disinfection. Now time is valuable and means life. If gloves are being used can not the infected be removed and replaced by sterile ones almost without delay and the surgeon proceed with his work aseptically.

In the field sufficient water for the mechanical disinfection of the hands is not always available; on the other hand, it is rare that enough water in which to boil the gloves can not be obtained. This water can be used over and over again if necessary, another important fact. Elaborate base hospital operating rooms and the most competent surgeons can not undo the damage done at a dressing station

by the mere touch of an infected finger to the wound or a contact dressing.

About 8,000 sick and wounded passed through Doctor Butz's hospital since the beginning of the war. As this hospital was near the front it was one in which operative cases, the result of wounds, were first attended to.

To September 15, 1905, there were 915 operations performed in this hospital, many of these minor ones. Doctor Butz stated that he had performed 12 laminectomies, 75 amputations, 15 resections, 25 excisions, 3 operations for aneurisms, 200 (approximately) trephining operations.

Three cases of tetanus were treated in this hospital. These all d

In the winter, after the battle of the Shake River and other engagements, the small bullet wounds were much oftener infected than in summer. The reason was simple. The soldiers were dirty and wore dirty clothing during the winter. It was so cold that their clothing could not be removed to apply the first-aid packet to the wound. Another element was probably the lowered vitality induced from exposure to the cold.

About 50 per cent of abdominal cases brought to this hospital died of peritonitis. Doctor Butz is strongly of the opinion that the non-operative treatment is the one to follow in these cases. He also believes in absolute quiet and nothing but water by mouth for eight days after the receipt of the wound.

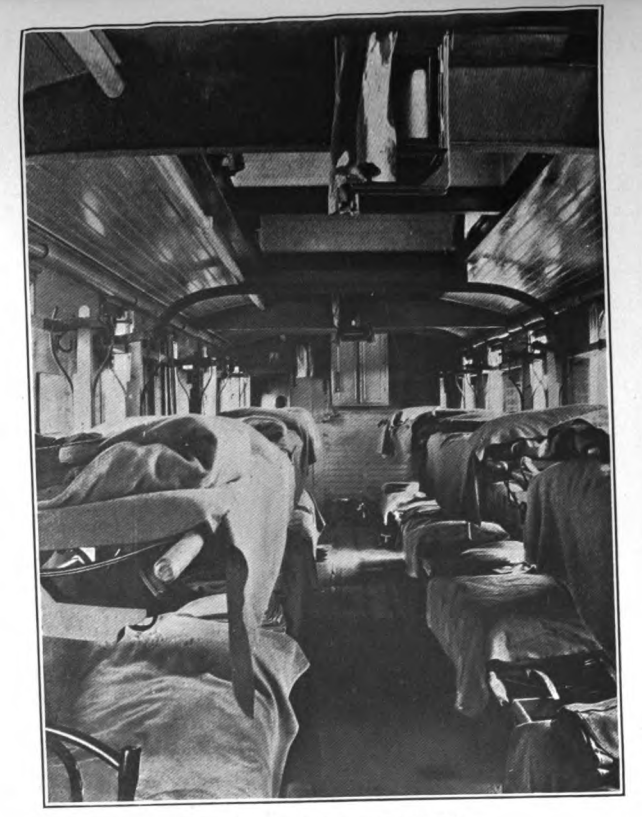
In regard to perforating wounds of the cranium, this surgeon operates in all cases. Trephines at both entrance and exit wounds and removes splinters of bone, makes a toilet of the dura and packs lightly with sterile gauze, always taking the precaution of dipping it into boiling water before placing in position. In this manner 50 pus cases and 150 clean cases were operated upon. Half of the pus and 90 per cent of the clean cases recovered.

Two cases of saber wounds of the vault of the cranium, were treated in this hospital. One was a clean cut through the bone and dura into the brain for a distance of 1 to 2 cm. In the other case, in addition to the cut, there was a depressed fracture. In both these cases bone was removed for drainage purposes, the wounds flushed out with salt solution and drained. Both healed without suppuration.

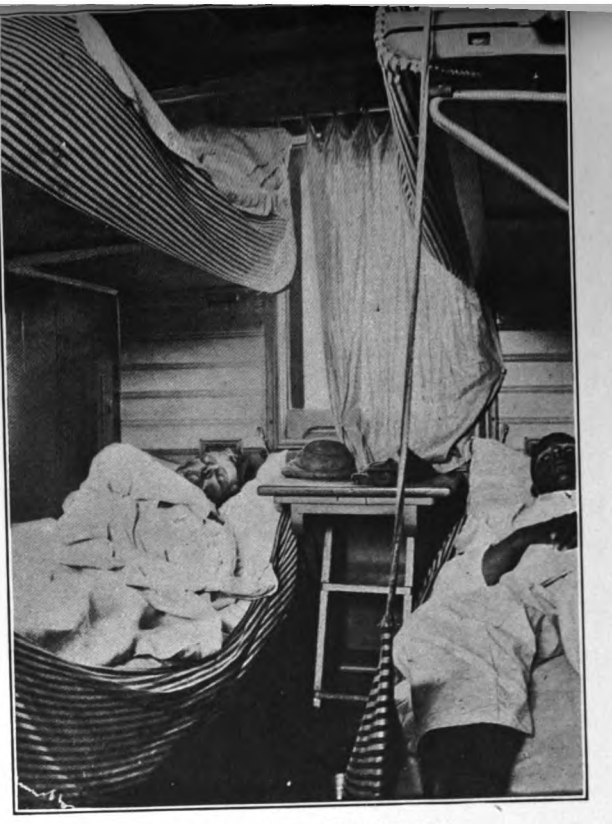
Doctor Butz believes in the handling of wounds as little as possible. In head operations he only uses his little finger, which has been dipped in a 10 per cent solution tincture of iodine, for exploratory purposes. After this nothing but the metal instruments touch the wounds.

In the head cases where there was much oozing, the gauze immediately in contact with the wound was not removed. The top dressings were replaced as often as necessary. Gauze, cotton, and wood cotton were the principal dressings used.

In all Doctor Butz performed 12 laminectomies for gunshot wounds. Some were simple wounds of the spinal column with cord pressure, others were complicated. Of these 12 cases 6 died soon after operation; the other 6 made operative recoveries. Two of these cases recovered so far that they could move their legs and stand up. Both cases were produced by small bullets and were perforating wounds. In the first, the bullet entered left side of body under ribs, took a direct course, and fractured the left transverse process of the first lumbar vertebra. Paralysis and anaesthesia of body below first



KRUGER SYSTEM, SHADED LIGHT.



THIRD-CLASS CAR, FITTED FOR SICK.

lumbar vertebra were the prominent symptoms. An incision was made over the spine, the depressed bone was removed, and about a tablespoonful of blood clot. The dura and cord were uninjured. The wound was drained and sewed up. The second case was similar in character, but involved the spinous process of the last dorsal vertebra.

Doctor Butz has operated on 5 localized abdominal abscesses occurring after perforating wounds of the abdomen by small bullets. The infection in these cases came probably from the intestines. The abscesses developed from one to two weeks after receipt of wound. Nothing more than a simple incision was attempted in the treatment. All these cases recovered.

Doctor Butz has treated 10 cases of bladder wounds produced by small bullet projectiles. Five of these on admission were complicated by peritonitis and died. Of the remaining five two recovered. The first of these was wounded while lying on the abdomen. The bullet entered abdominal wall, passed through anterior and lateral wall of bladder, and out through ischiatic region. The bladder was opened by a vertical incision, wound packed, and bladder drained by a catheter. Man made a speedy recovery. The second case of recovery was wounded by a small bullet which passed transversely through the anterior superior portion of the bladder. The peritoneal cavity was opened in this case. A transverse incision in lower part of abdomen was made six hours after injury. Some urine had escaped into the abdominal cavity. This was sponged out, the bladder wall was sutured, bladder drained with a catheter, and wound packed.

Doctor Butz is of the opinion that unless bladder cases with peritoneal involvement are operated upon within a few hours after receipt of the wound they are hopeless.

In this hospital a case of scurvy was admitted presenting signs of peritonitis. The abdomen was opened and found full of blood clots. The man died.

An interesting case of gunshot wound occurring in a medical man was treated without operation while the hospital was in Mukden. The small projectile penetrated the body transversely through the liver, stomach, and anatomically through the spleen. No nourishment was allowed this case by mouth for two weeks, at the end of which time no gastric symptoms remained. Recovery was rapid and uneventful.

Doctor Butz has treated a number of liver wounds produced by small projectiles. Many of these cases recovered without operative procedures; in others, especially where the pleural cavity was involved, he found it necessary to establish better drainage, and so removed portion of ribs. This mode of procedure was followed in all infected cases.

A case shot through the heart by a small bullet presented on admission, one day after receipt of wound, signs of cardiac embarrassment. The man was cyanosed and suffered with apnœa, heart sounds were muffled, pulse was weak and irregular. Man recovered and left the hospital presenting no alteration in the heart sounds. A second case, similar to the above in the character and position of the heart wound, developed a suppurative pericarditis and ended fatally.

In this hospital six cases of anthrax were treated by excision and the cautery; all recovered.

Twenty-four cases of hospital gangrene came under the care of Doctor Butz, only one of which recovered.

These cases occurred usually in men who had been severely wounded by shrapnel in the winter. Pieces of dirty sheepskins, which they were wearing, were almost always found in the wounds. These men also were men who had been without medical assistance for two to four days after being wounded. The gangrene was characterized by gaseous formation in the tissues, and was called by the Russians "phlegmon gangreosa."

Silk of different sizes was used universally by the Russian surgeons for ligatures and for cutaneous sutures.

Some of the German doctors used catgut ligatures.

The silk was always sterilized by boiling before using, and gave very little trouble afterwards. In cold and temperate countries silk can be used with less chance of producing trouble than in the Tropics.

Another of these railroad Red Cross hospitals was the St. Eugenie. This hospital occupied a position near the front during the whole war. During the last four months of hostilities this hospital was situated in Hirsu, which was on the left flank of the army, and communicated, by the De Cauville line, with the railroad proper at Gunchulin. Use was made while in Hirsu of a collection of large Chinese houses surrounded by a high mud wall. The Chinese houses were well built and were situated among a lot of trees on high ground. Good water was obtained from a deep well. This well was kept covered, and, as it was sufficiently distant from any habitation, the water was free *from* suspicion.

This hospital could accommodate 500 patients, if necessary. The medical personnel was about the same as Doctor Butz's hospital. The surgeons were up-to-date in their methods and performed good, clean, surgical work.

The operating room in this hospital was situated in a Chinese house, the doors and windows were screened, and the floor had been cemented. The walls and ceiling were covered with oiled canvas painted white. The sterilizers were large and sufficient to provide sterile sheets, gowns, and dressings for any operations that were undertaken.

The water used for washing the hands was sterile, and the flow was regulated by an arrangement that was worked by foot pedals.

There were two bath houses situated in tents, one for infectious cases and the other for the other patients. All the water used in bath house by dysentery and typhoid cases was collected in a large earthenware retort and disinfected by the addition of carbolic acid.

The water closets in this hospital for the men and officers were placed in small thatched buildings, well covered and well ventilated. All fecal material was deposited in receptacles placed under the seats in such a manner that they could be removed and emptied from the outside of the building.

The urine of all patients was kept in closed tanks which were regularly emptied.

Infected clothes were disinfected in this hospital by formalin in small mud huts, which were made air-tight by papering the sides with heavy paper. The disinfection seemed to be thorough.

An idea of the class of cases treated in this hospital can be obtained from the following admissions during the first week in September, 1905:

| | |
|---|---|
| ounded | 12 |
| aumatisms | 6 |
| fluenza | 54 |
| ysentery | 1 |
| yphoid | 50 |
| nterocolitis | 41 |
| leuritis and bronchitis | 6 |
| ye diseases | 3 |
| kin diseases | 3 |
| theumatism, etc | 38 |
| Total | 209 |

An interesting case of brain injury was seen in this hospital. An officer dropped a Browning revolver; a bullet was discharged and entered his head in the right zygomatic region. The ball took a direct course, pierced the skull, and made its exit in the center of the forehead, fracturing the frontal bone in many pieces. This wound was enlarged, the bone and eight ounces of disorganized brain tissue removed, and the wound drained. Right optic nerve had been severed with consequent loss of sight in the right eye. The man appeared to be in possession of all his faculties, and his recovery had been uneventful, except that he had taken to writing poetry.

The sub-base hospitals were situated between Harbin and the front.

At Gunchulin there were several Red Cross hospitals permanently established in brick buildings that had been built for hospitals.

One field hospital was detailed to establish an infectious hospital in specially constructed wooden buildings. A second field hospital occupied some buildings that were set apart for the treatment of cholera cases, which happily never materialized. A third field hospital was placed in a large new brick barrack building, and was used as a surgical hospital.

Two Red Cross hospitals were placed in large brick barrack buildings. These were used for the treatment of typhoid and dysentery cases.

The isolation or infectious hospital in Gunchulin occupied about three acres of land and consisted of three wooden buildings, two large hospital tents, a number of smaller tents for isolation purposes, a disinfecting plant, and a kitchen. The wooden buildings were substantially built. The walls consisted of two wooden partitions about a foot apart. Between them was earth. The roof was constructed in the same manner. Earth was made use of to keep out the cold, it being a good nonconductor.

In this hospital 200 patients could be accommodated. It was originally planned that this hospital should be reserved for the purpose of making a correct diagnosis and treatment of suspected cases of plague, cholera, typhus, anthrax, and erysipelas. As no plague or cholera developed amongst the troops, the hospital was used for the treatment of anthrax, erysipelas, some typhoid, and dysentery cases. The wooden building was so partitioned that cases could be isolated.

The personnel of this hospital was 1 chief doctor, 4 assistants, 6 sisters, who divided the work up among them as it appeared. The rest of the personnel was the same as that of a field hospital.

In all 12 cases of anthrax had been treated in this hospital during the war without a death. The pustules were cauterized with a paquelin cautery, then 5 to 20 cc. of a 3 per cent carbolic solution

were injected into the circumference of the inflammatory zone. Hot gauze compresses, saturated with a 3 per cent acid carbolic in a 1 to 1,000 bichloride of mercury, were applied to the wounds and tonic treatment was administered internally.

A number of cases of facial erysipelas and erysipelas involving other parts of the body were treated in this hospital. The favorite treatment consisted in the local application of equal parts of tincture of iodine and spirits of camphor. Quinine and camphor were given internally.

The dysentery cases, which were mostly due to a Shiga bacillus infection, were treated by the administration of 15 grams of magnesium sulphate on admission. After this, 15 grams was dissolved in 200 cc. of water, and this was given in the course of twenty-four hours. Nothing was given to eat for twenty-four to forty-eight hours. If the blood did not disappear from the stools a second 15-gram dose of sulphate of magnesia was administered. Sometimes bismuth subnitrate was used after the subsidence of the acute symptoms. Rice well cooked was the first food allowed. Excellent results followed this line of medication.

The first real base hospitals were at Harbin. Here were situated, in addition to 31 military hospitals, a large number of Red Cross hospitals, supported by various towns throughout Russia; also, a large convalescent camp. This city was truly a hospital city. Red Cross flags were flying over almost all buildings of any size. As has been stated before, there were 960 beds for officers and 19,200 beds for men in the various hospitals.

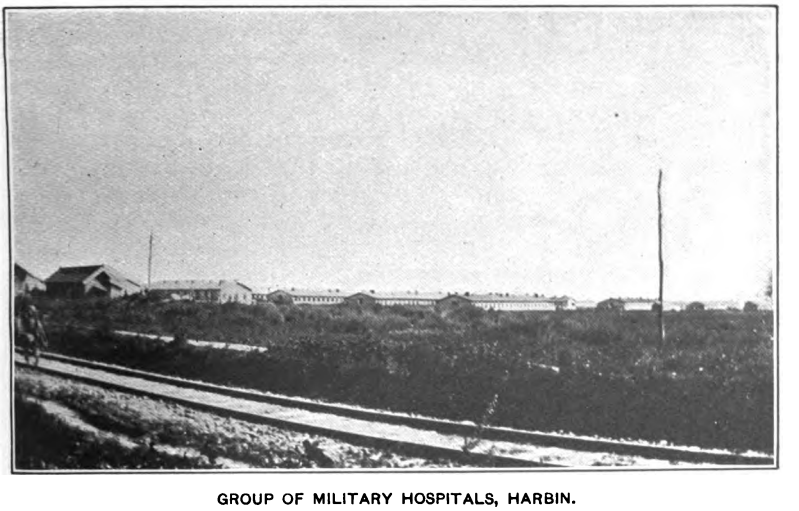
The military hospitals were numbered from 1 to 31. Each hospital was organized on the basis and with the equipment of two field hospitals. The working staff of each hospital consisted of 1 chief surgeon, 6 assistant surgeons, 10 sisters, 14 feldschers, 150 sanitats, 1 intendant officer, 1 assistant bookkeeper.

These hospitals were situated in large stone, brick, or wood buildings. These buildings could be used either for barracks or hospital purposes, and were constructed with this idea in view. The buildings were 225 feet long by 80 feet broad, and consisted usually of two large wards connected by a higher center building. In the center building, if there was one, were situated the bath and toilet rooms, the closets for men, and at times the operating and dressing rooms. The operating rooms and pharmacies were mostly found at the ends of the buildings. The kitchen and bakery were usually in a separate building.

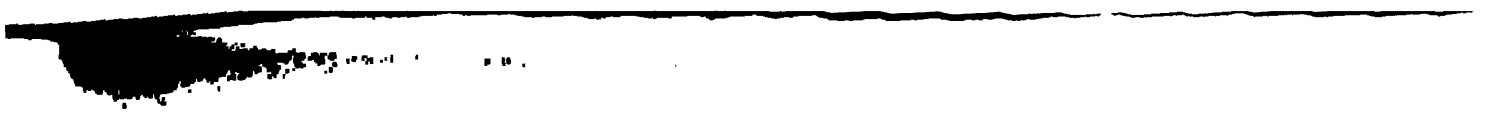
These buildings were built on solid stone foundations, the floors were usually asphalt, the sides were stone, brick, or two partitions of wood with earth interposed. The roofs were high, and large glass skylights ran the whole length of the building, which, with the addition of the large windows on the sides, made the wards very light. The windows were double, on account of the cold in winter. There was no special ventilating system in these buildings. Heat was obtained from large Russian stoves, four of which were placed in a ward, one in each corner.

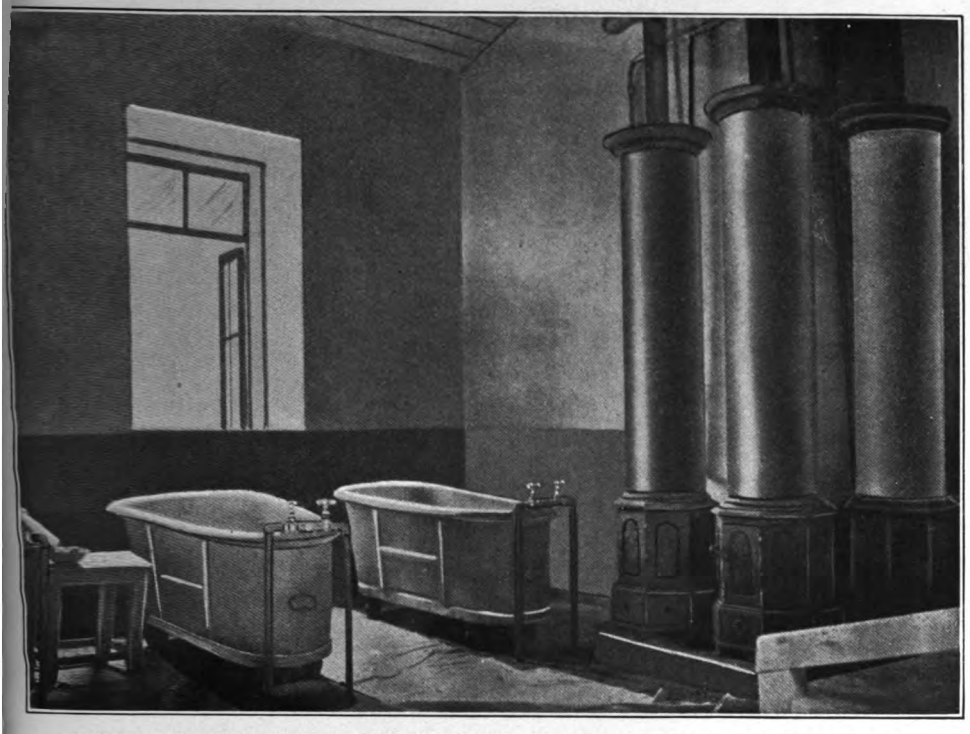
Each hospital consisted of 4 wards. Each ward contained 100 beds, arranged in 4 rows, 25 beds in a row. Thus each hospital was provided with 400 beds for men. Forty additional beds for officers were usually situated in small brick dwelling houses. This capacity could

TYPICAL BRICK BARRACK HOSPITAL, HARBIN.

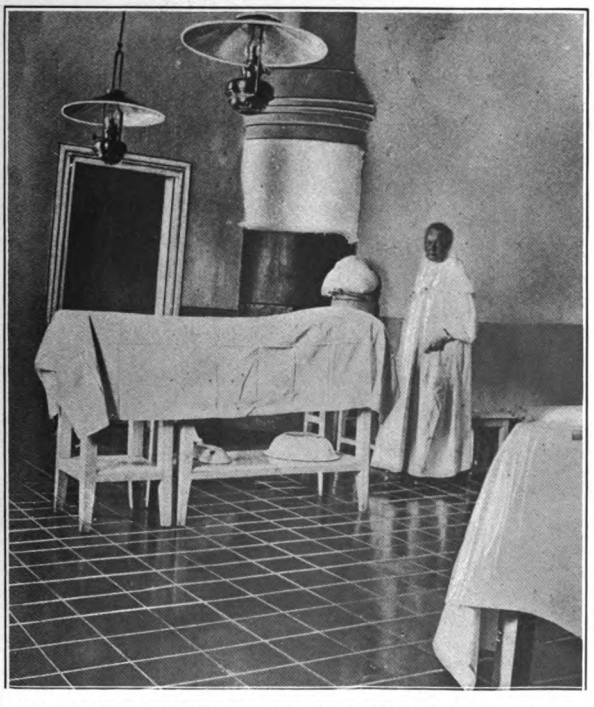


GROUP OF MILITARY HOSPITALS, HARBIN.

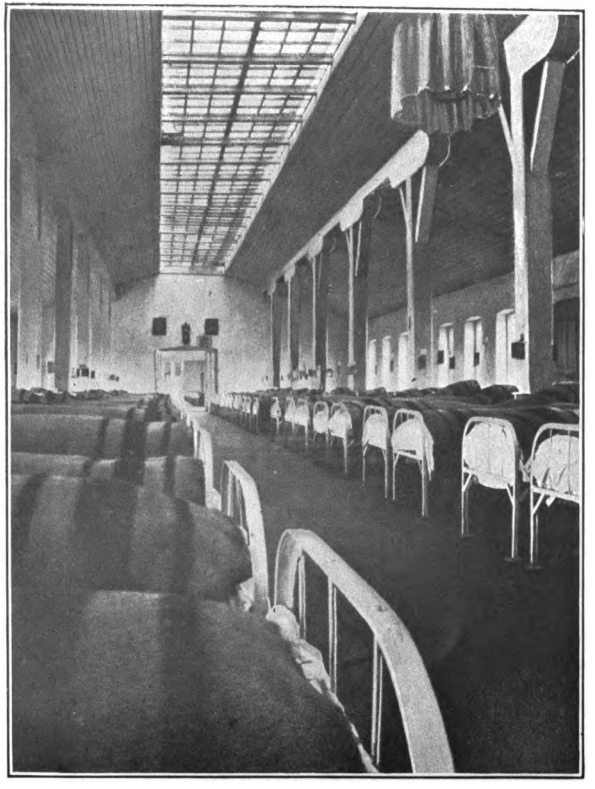




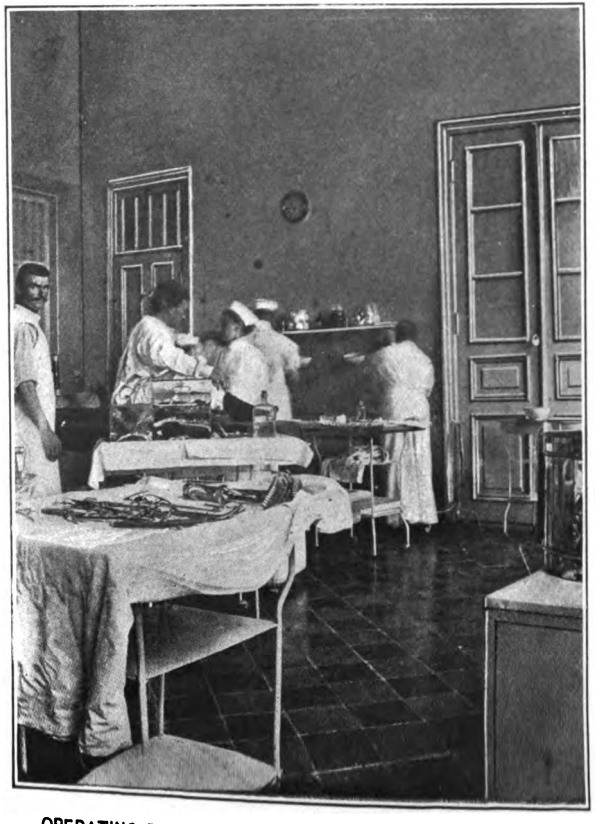
TYPICAL BATHROOM, WITH TIN TUBS AND RUSSIAN STOVES, IN MILITARY HOSPITAL, MANCHURIA.



OPERATING ROOM, ST. GEORGE RED CROSS HOSPITAL, HARBIN.



WARD IN MILITARY HOSPITAL NO. 7, HARBIN.



OPERATING ROOM, GERMAN RED CROSS HOSPITAL, HARBIN.

be increased by 50 per cent by placing patients on stretchers on the floor.

Military hospital No. 1 was situated near the station in stone barrack buildings. The rest of the military hospitals were clustered in two groups on the outskirts of the town. The first group contained hospitals Nos. 2, 3, 13, 14, 16, 17, 19, 20, 21, 22, 24, and 29. The second group the rest of the military hospitals.

The first group was on comparatively high ground and adjacent to the railroad. With this group of hospitals were a number of brick houses for office buildings for the medical inspector-general of the army of the rear, the veterinary department headquarters, and quarters for the doctors and sisters. These buildings covered about 14 acres of ground, and the substantial manner in which they were built made an imposing sight.

Certain of these hospitals were assigned to the treatment of special diseases. Thus Nos. 2 and 3 were used for surgical purposes. No. 7 was used for skin diseases. No. 31 was an isolation hospital, in which contagious diseases were treated, and so on. These hospitals were kept comparatively empty. Row after row of empty beds not only spoke eloquently for the general health of the army, but also showed the preparedness of the medical department for an emergency.

The second group of hospitals was situated farther out from the city on high ground, and covered an area of about 1 mile by one-half mile. The buildings were mostly wood, well constructed, and in size about the same as the stone and brick structures. As in the first hospital groups, it formed a complete town by itself. There was a siding for the railroad track fitted up with a long platform for receiving and discharging patients from the hospital trains. A small De Cauville railroad ran to this hospital from the evacuation hospital in the city proper. There were a number of small buildings all laid out in order. These were used for quarters for the doctors, sisters, storehouses, kitchens, bakeries, churches, canteens, etc.

The floors of all the buildings were made of asphalt. The unoccupied wards were well painted, iron beds of uniform pattern were arranged in neat rows, the beds were all made up, and on each bed was a cotton nightshirt, drawers, socks, and a long woolen coat, something like a kimona. The wards that were occupied were always neat. The patients looked happy, well fed, and thoroughly contented.

The doctors, sisters, and sanitats on duty wore long cotton gowns. The case papers, including the temperature charts, were kept at the head of each individual bed, but histories and notes from time to time were written by the doctors in charge of the case. The diet prescribed and the treatment were also recorded. The system of keeping the hospital records was complete and good.

The operating rooms in these hospitals were clean, all kept freshly painted, and the instruments those supplied to field hospitals. When special surgical work was performed an operating room for clean cases, with a separate set of nurses and equipment, was kept distinct from a second room in which pus cases were dressed and operated upon. There were always plenty of sterilizers, dressings, and sterile water for washing purposes in the hospitals for use for operative purposes.

Silk was used almost exclusively as a ligature and for suture material.

For dressings, these hospitals used large rolls of gauze, cotton, wood cotton, gauze, and muslin bandages.

The Russians apply larger dressings to their operative wounds than we do. Crinoline and plaster bandages were also used to a large extent in these hospitals.

Excellent wire splints to fit the different parts of the extremities were at the disposal of the surgeons.

The pharmacies were in charge of apothecaries or feldscher apothecaries. The drugs are identical with ours.

In all the hospitals there were bathrooms containing usually four large tin bath tubs about the same size as our porcelain ones. There was always a plentiful supply of hot water, and all patients that were able were required to bathe at regular intervals.

The sewage systems were different. In the first group of hospitals a water-closet system was in use. The drains led into a small creek, which emptied into the Sungaree River. In the second or larger group of hospitals a simple system of collection and removal of all excreta was rigidly carried out. This was far better than a sewage system used in the first group of hospitals.

Small wooden outhouses were built between the buildings for patients that could be about. The seats in these buildings were built about 6 feet above the level of the ground, and from the outside a small truck, tarred inside, fitted neatly under the seats. This truck was removed by a horse every morning and replaced by another. Lime was used about these closets; they were quite clean and so arranged that flies could not come in contact with the excrement.

In the ends of the wards closets were arranged on the same system. There were six seats on a platform, which was covered with black oilcloth. The holes were kept covered with wooden lids. The same sort of trucks that were used in the outhouses were run in under the seats from the outside and were regularly emptied.

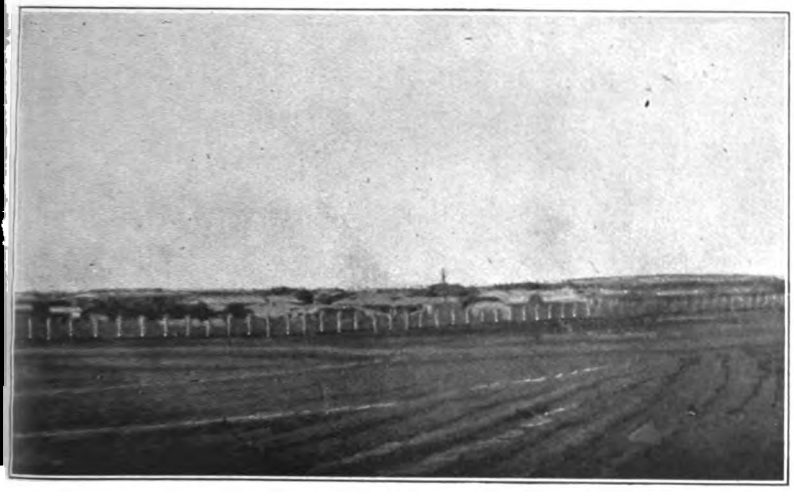
In these buildings very good urinals were in use. They were constructed of tin and about the size of a large milk can. The urine was caught in a perforated funnel tarred inside. Around the top of the can was a tray filled with wood ashes, which was placed in this position to catch any drops of urine that did not go into the funnel.

The kitchens in these hospitals were situated in separate buildings. In each there were two large copper retorts for preparing soup, and a large brick stove. Chinese cooks were employed and could prepare any required diet.

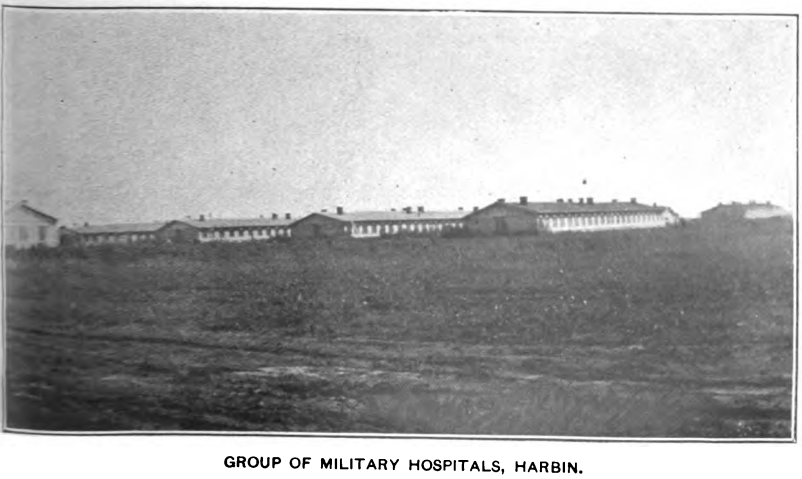
The bread was made in bakeries which were situated in separate buildings, and was of two qualities—black and white.

Convalescent patients not requiring special diet were fed twice daily, the first meal about 11 a. m. and the second about 5 p. m. Tea was served at 8 a. m., 4 p. m., and 8 p. m. The diet was the ordinary vegetable soup, containing three-quarters of a pound of meat for dinner and one-quarter of a pound for supper. One and one-half pounds of black bread and one-half pound of white bread, with about one-sixteenth of a pound of sugar, were issued to each patient daily.

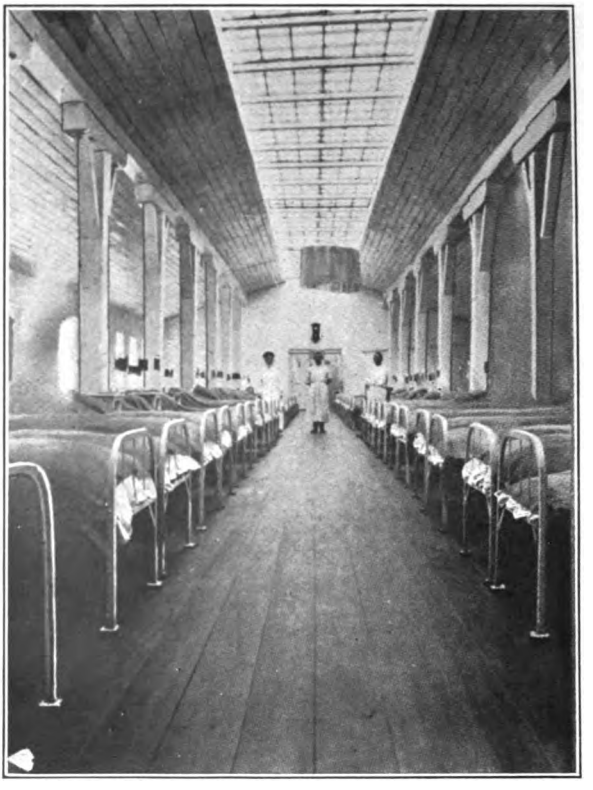
Two other diets were prescribed with variations. What was called the "second ordinary portion" consisted of soup with rice, buckwheat,



RAILWAY HOSPITAL, HARBIN.



GROUP OF MILITARY HOSPITALS, HARBIN.



TYPICAL WARD, RUSSIAN MILITARY HOSPITAL.

SURGICAL WARD IN MILITARY HOSPITAL, HARBIN.

or barley, and 2 pounds of white bread a day. The "weak portion diet" consisted of bouillon or chicken soup, 2 pounds of white bread, cooked rice, eggs, cutlets, or milk. The "special scurvy diet" consisted of the above diet, with the addition of fresh vegetables. A regular diet sheet was made out daily by the medical officer in charge of the wards, and they could order practically what they liked.

All bed linen and soiled clothes in these military hospitals were disinfected, sometimes by steam and always by boiling, before being washed. The washing was done by Chinamen in washhouses constructed for this purpose in the hospital grounds.

Connected with each hospital was a storehouse, where the patients' effects were kept. Large quantities of clothes and equipments of various kinds were also stored here, so that when patients were discharged to duty they could not only be supplied with clothes, but also with arms.

If a patient died, his personal effects, if any, were sent to his family.

The large base isolation hospitals were situated beyond the second group of hospitals and was officially known as hospital No. 31. The buildings covered about 6 acres of ground, but 20 more acres were available if necessary. In this hospital 600 beds were kept in readiness, and many more could be placed in position on short notice. The hospital arrangement was quite different from the others. Instead of two large buildings for the patients there were a number of one-storied buildings built especially for the treatment of infectious and contagious cases. There were also a number of ordinary hospital tents erected on wooden platforms and some portable paper Christoph Unmack houses. Twenty-six large hospital tents were kept in reserve.

There were eight wooden buildings constructed on the same plan as the larger hospitals. In the center of these buildings was a large ward containing from 18 to 20 beds. Rooms for sick officers, for the attendants, and the closets were situated at the ends. One of these buildings was used for cases in which the diagnoses were doubtful. One building was reserved for smallpox, one for typhus, one for plague, one for scabies, one for erysipelas, and one was reserved for the treatment of sick sisters. The rest were used as occasion demanded.

The kitchen was in charge of Chinese cooks in a separate building, and this was capable of preparing food for 1,500 sick.

The washhouse was in a separate building. Sixteen Chinamen were employed for this work. All the clothes were first put into large copper retorts and boiled in a soda solution. Scrubbing boards, a washing machine worked by hand, and wringers of American make were in use.

The disinfecting plant was situated in a separate building. There were large iron retorts for soaking infected clothes in carbolic acid solution. There was a large Stute & Blumenthal formalin disinfector, which was 6 feet high, 7 feet long, and 4 feet wide. A Raphchefski steam camera was in use. This sterilizer was constructed on the same lines as some of the sterilizers used for sterilizing dressings. It is in the form of a large cylinder. Steam is generated from water heated by wood fire. In addition to these, there was a double steel chamber

sterilizer (Boy & Ray), each compartment 8 feet long, 5 feet high, and 4 feet wide. No steam connection had been effected, but near by was a traction engine from which it could be obtained. This engine not only generated steam, but could also be used to transport the steel disinfection chambers, so the whole disinfecting plant could be moved at will.

Among the army no cholera, plague, and very few cases of smallpox, typhus, measles, or anthrax developed, so all these precautions and preparations for treating infectious cases were happily little used.

On September 22, 1905, 12 cases of plague in a small station named Dgailailor were first reported. This station was on the Siberian Railway near the Mongolian border. Of the 12 cases 11 died. Steps were immediately taken to stamp out the disease and prevent its spread. The houses inclosed in this small village were burned and the people were placed in a rigid quarantine. All trains were inspected before reaching this station, and passed the infected point without stopping. The infection was undoubtedly received from Mongolia, in which country plague is endemic.

A Roentgen ray apparatus was in use in military hospital No. 2, where most of the surgical work was performed. Cases were examined with a fluoroscope. Very few pictures were made.

Connected with infection hospital No. 31 and the second group of hospitals was a very well-equipped laboratory in charge of a medical officer and his assistants. Cultures of all descriptions were kept here. There were two incubators in use, plenty of culture media and stains. Widal reactions were constantly being made; the differential diagnosis between typhoid, typhus, and para typhoid was settled here in doubtful cases.

### MILITARY BACTERIOLOGICAL LABORATORY.

The best military bacteriological laboratory was situated in military hospital No. 1, at Harbin. It was in charge of Doctor Korentschewsky, a young Russian doctor in the regular military service. He had taken post-graduate courses in bacteriology in Berlin and Paris and was eminently fitted for the work he was doing. Under him, working in the laboratory, were an assistant and an apothecary officer. This laboratory was very well equipped with good incubators, microscopes, and apparatus for conducting chemical tests. A number of guinea pigs and rabbits were kept on hand for diagnostic purposes. In this laboratory were examined specimens of blood, urine, feces, sputum, water, milk, and meat from Harbin and the surrounding country. The Widal reactions in this hospital were performed mostly by dissolving suspected blood out of small pieces of blotting paper on which it had been collected and performing the test in watch crystals.

In performing the Widal reaction to the blood solution was added a twenty-four hour bouillon typhoid culture in dilution of 1 to 80. The agglutinating test showed very plainly in one-half to one hour if the blood were from a case of typhoid. The advantage of this method was its simplicity and quickness.

Diagnoses were made in cases of para typhoid (A & B) by using a culture of Schöttmuller, the germs of which were kept in the same manner as the Erbeth bacillus. An agglutinating test was made with a bouillon culture of this germ with the patient's blood.

INSANE HOSPITAL, HARBIN.

In the Institute of Experimental Medicine in St. Petersburg there are prepared from horses serums of cholera, typhus, Shiga dysentery, and pseudo dysentery. These are used for diagnostic purposes in making agglutinating tests with the germs of the respective diseases.

In the examination of feces, eggs of intestinal parasites were found in the following proportions: Bothriocephalus latus, 1 per cent; tænia solium, 40 per cent; tænia sagmatus, 40 per cent; ascaris lumbricodes, 57 per cent; oxyuris earmicularis, 1 per cent; tricocephalus dispar, 1 per cent. No trichina eggs were found.

Doctor Korentschewsky used sugar agar media for determining the quantity of gas production of different germs under examination. For the differential diagnosis of the bacillus coli communis, bacillus dysentericus, b. typhosus, para typhoid (A), and para typhoid (B) his technique was most complete.

In 150 cases of dysentery the Shiga bacillus was found in all. In 4 cases, in addition to the Spiga bacillus, the amœba dysentericus was demonstrated. These cases were much more severe than the others; 2 of them died. Ulcerations in the large intestines were found in both; in one there were two abscesses in the liver.

Glass bottles of the capacity of 1,000 c. c. were used to collect water for examination. In addition to the ordinary chemical test for ammonia, nitrites, nitrates, etc., Doctor Korentschewsky made bacteriological examinations of the different samples. Colon bacilli were found in well water and other waters many times. The Shiga and typhoid bacilli were found only occasionally. The number of colonies in 1 c. c. of Harbin water varied from 1,000 to 20,000. The wells in the city proper which were lined with wood that had rotted contained the worst water. A number of these wells were filled up on the doctor's recommendation. The best water was obtained from artesian wells, and the next best was filtered water from the Sungaree River.

Meat and milk were examined bacteriologically in this laboratory also. The meat was always passed upon by the veterinary surgeon before coming to the laboratory. Here it was examined for trichina and evidences of pest or tuberculous infection.

For the insane use was made of a large three-story brick building in Harbin. The windows were barred. The rooms were arranged for the treatment of cases of mania and other cases. The mattresses were placed on the floor in most of the rooms. In all 70 patients could be cared for at one time. Two doctors from Warsaw, who were specialists in nervous diseases, were in charge. The rest of the medical staff consisted of 5 sisters, 12 feldschers, 35 sanitats, and some Chinese servants. The feldschers were kept to send in charge of patients on the hospital trains.

## CARE OF THE INSANE.

All insane cases, both officers and men, that developed in the army and other hospitals were sent to this hospital for observation and transfer westward to the insane hospitals in Moscow or other cities. In all about 1,300 patients had passed through this hospital; 250 officers, the rest soldiers. In officers chronic insanity occurred in 85 per cent of the cases and acute insanity in 15 per cent. The percentage was just reversed in the case of the soldiers. Among the officers there were some cases of nostalgia. None occurred among the men. Alco-

holic insanity occurred among the officers, but no cases observed among the men. A few cases of brain syphilis among the officers were treated.

In the middle of August, 1905, there were 49 cases in this hospital. Some were epileptic insanities. There were several acute manias, some paranoias, and a few cases of dementia præcox. Very few cases of true melancholia had come to this hospital.

While the war was in progress new Red Cross hospitals were continually arriving in Harbin. Most of the houses of any size were turned over to them. They all worked along in the same line, and in some the personnel and equipment was better than in others; consequently better work was performed.

The Libau Red Cross hospital was situated in a large new building that had been constructed for a hotel, but never occupied. This hospital was supported by the people of Libau, and was in charge of Doctor Boynton, a native of Finland. The hospital was equipped for 200 sick officers. There were 60 rooms. Each room could accommodate from 2 to 4 patients. The whole air of the building was that of a modern hospital. Eighteen well-qualified sisters divided the nursing and work in the operating rooms between them. Everything ran smoothly.

In a modern operating room, with up to date equipment and furniture, Doctor Boynton performed a large number of operations very skillfully and successfully.

The beds, bedding, dressings, splints, etc., were of the best quality and left nothing to be desired.

The building was lighted by electric light supplied from its own dynamo. A Roentgen ray apparatus was in use. Fluoroscopic examinations only were made. Doctor Boynton used the instrument a great deal in locating bullets and fractures.

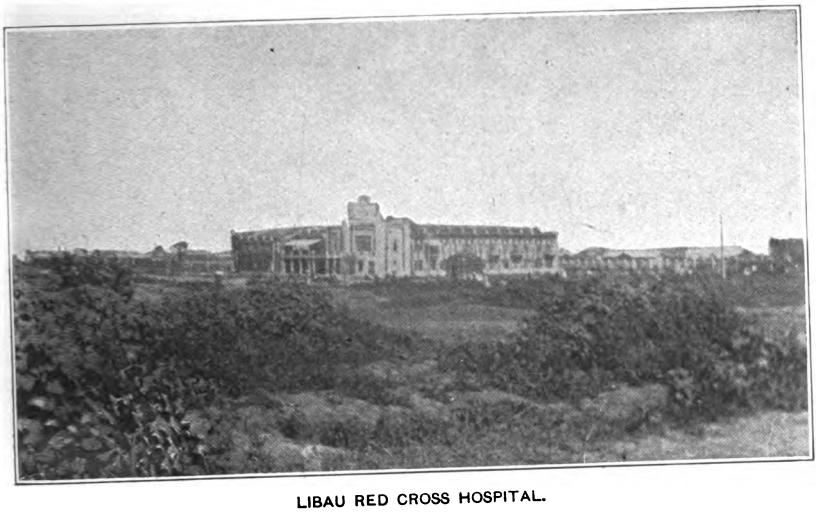
There was a small laboratory in this hospital for the conduction of the ordinary clinical examinations.

Near the railroad station there were two large Red Cross hospitals, the First St. George of St. Petersburg and the Elizabeth. Both of these hospitals were situated in stone barrack buildings and could each accommodate from 400 to 600 cases.

From January 14 to August 14, 1905, there were treated in the First St. George Hospital 1,717 cases, with 78 deaths. Average admission about 8 per day. On September 2, 1905, there were under treatment 177 cases: Dysentery, 37; wounded, 12; muscular rheumatism, 26; typhoid, 41; scurvy, 1; other cases, 60.

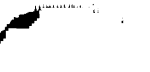
Good work was done in both of these hospitals. The wards were well kept, the straw mattresses, bedding, and clothing for the sick were all clean and of good quality. The operating rooms, pharmacies, bathrooms, etc., were well arranged. In both of there hospitals the water used in the operating rooms was filtered and boiled. The clean cases were separated from the pus ones, and separate rooms and nurses were provided for each.

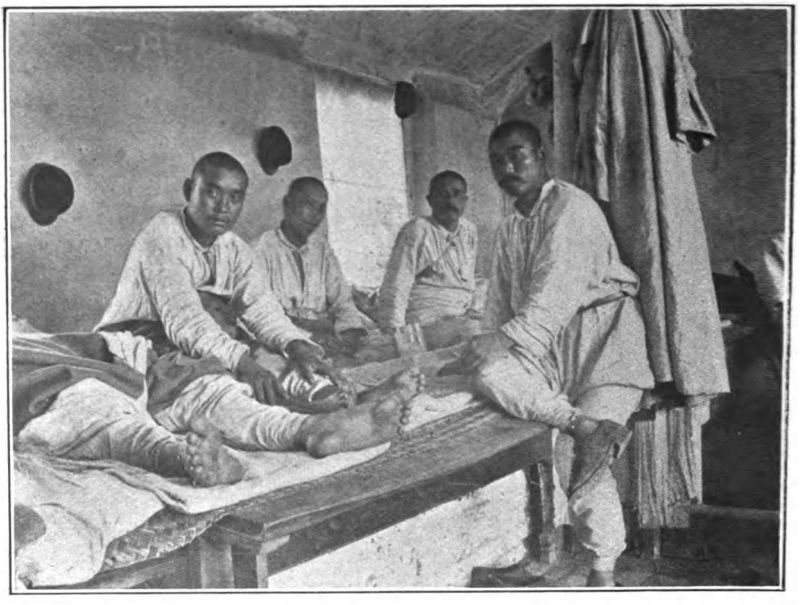
The German Red Cross Society sent a complete hospital to Harbin. It was placed in a large two-story stone building which had been a boys' school. Doctor Brentano was originally in charge and was relieved later by Doctor Colmers. The equipment was designed to treat 200 patients at one time. The beds were iron of a very good



LIBAU RED CROSS HOSPITAL.

KAUFFMAN RED CROSS HOSPITAL, VLADIVOSTOK.





NOBILITY RED CROSS HOSPITAL, GOTSEADAN.

RED CROSS HOSPITAL, GOTSEADAN.

design, the mattresses were hair, and each consisted of three sections, making the whole outfit very easy to pack and transport. The pillows were horsehair. The iron bedsteads weighed 20 pounds, the mattress, pillow, and bedding, complete, 20 pounds more, so the bed complete only weighed 40 pounds. In this hospital, which was thoroughly German in all particulars, there was a good laboratory with all equipments. Bacteriological and microscopical work were carried on in a thorough and scientific manner by a doctor who did nothing else.

In the building there were a dynamo, electric lights, and an X ray apparatus. Some very good pictures were taken with this machine.

In the operating room, which was well equipped, the greatest difference noticed from the operating rooms in charge of Russian surgeons was in the use of rubber gloves, which were used in all operations. Catgut, prepared by the method of Claudius, was used for ligatures internally.

Connected with this hospital was a reception ward in a portable house. All cases were kept here until diagnosed. They were then given a bath and admitted to the wards.

There was a large steam disinfecting plant in this hospital in which all bed linen and clothes of patients were disinfected before being washed.

The dysentery cases in this hospital were treated with castor oil and tan albumin with good results.

In the wards were a number of operative cases for gunshot wounds. Most of these were aseptic and looked well. Extension apparatus were more in evidence in cases of fractures of the thigh than in the Russian hospitals.

Doctor Colmers, who is an excellent surgeon and treated a large number of gunshot wounds, stated that the cases in which merely a dressing had been applied and bandaged, without any attempt at plugging to control hemorrhage, did far better than the wounds that had been handled at the field hospitals. He believed that wounds should be handled as little as possible on their way to the base hospitals. Doctor Colmers saw and operated upon a number of gunshot wounds of the skull. At first, in cases where there was a clean perforation of the skull with apparently no splintering of the bone, no operative procedure was thought advisable. Most of these cases suffered from no symptoms for a variable period of time (from one to six months), then headaches, epileptic seizures, cerebral abscesses, and insanity were not uncommon occurrences, whereas in similar cases that had undergone operative treatment these unpleasant results were far more rare.

The operation performed in these simple perforating wounds was the removal of a button of bone at the entrance and exit wounds by means of a trephine. In many cases small splinters of bone were found imbedded in the damaged dura of the entrance wound. The rationale of the operation was that a toilet of the dura was accomplished and better drainage was obtained, consequently the dura healed with a smaller and less adherent cicatrix.

In this hospital up to August 16, 1905, 127 operations had been performed. Thirteen of these cases died—4 from tetanus, 4 from sepsis, 1 from peritonitis, 2 from meningitis, and 1 from wound of the

spleen. The infected cases were all admitted as such. A number of resections, operations for aneurism, and several operations for suture of nerves were included among the operations.

Four cases of abdominal perforation by small bullets developed pelvic abscesses. The pus was evacuated through the rectum.

There were a number of cases of shrapnel wounds in the surgical wards. These cases were, as a rule, badly wounded. One man had 15 distinct wounds and had lost parts of both legs, one hip, and some of his abdominal muscles. Four months after injury what was left of him was in fairly good condition. All the wounds had healed, but he will remain a helpless cripple the rest of his life.

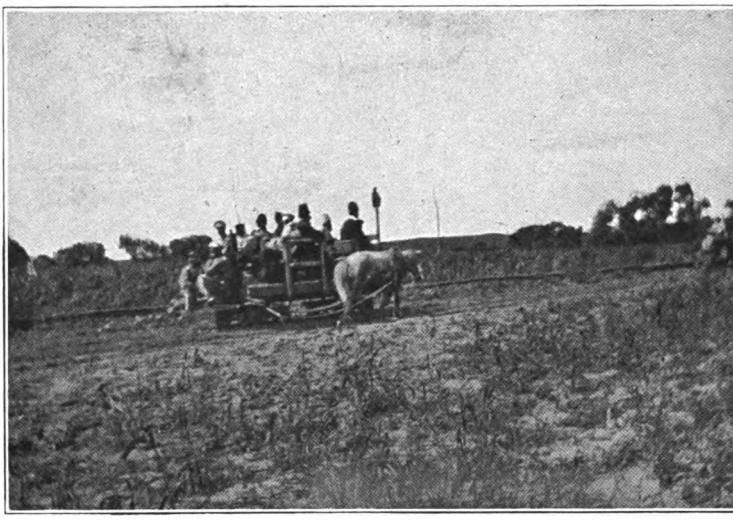
In this hospital several nerve suture operations were performed. When the nerve had been simply severed, its function was usually restored if the ends had been approximated shortly after injury. In one case the soldier while fighting at close range received two small bullet wounds through left arm. The humerus was not fractured, but one of the bullets completely severed the musculo-spiral nerve. This case was operated upon three days after receipt of injury. The nerve was sutured. Six weeks after the operation decided sensation and muscular force were returning. A second case of nerve injury, with paralysis of the extensor group of muscles of forearm, showed the bruising effects of the passage of a small bullet at high velocity close to nerves. This man had been shot through the upper portion of the axilla. The projectile passed close to the large nerve trunks. The wound became infected, and the whole axilla was distended with pus. Such was the condition on admission to the hospital. The axilla was opened by two incisions, the nerves traced out, but no apparent injury was found. Nine weeks after axilla was opened and drained sensation and motion were returning to the paralyzed parts.

Another case of bruising of the long saphenous nerve by the passage of a small bullet through a thigh was in the wards. The bullet in this case perforated the artery and vein in Hunter's canal. Symptoms of involvement of the long saphenous nerve were also prominent. At the time of the operation for the removal of the aneurismal sac the nerve was carefully exposed and found to be intact. This case also terminated favorably. Sensation returned to the parts involved in the course of three months.

### USE OF HOSPITAL BARGES ON RIVERS.

In some of the country in which the campaign was taking place it was thought that wounded and sick could be transported by water. For this purpose a number of hospital barges were fitted out. On the Sungaree River there were 16, varying in size from 125 to 200 feet long by 30 to 40 feet in width, all drawing very little water. These barges had originally been used for transporting merchandise, wood, grain, etc., in the river. They were all housed over, partitioned off into rooms and wards, and for the most part were fitted up most comfortably. The larger barges could accommodate 150 men and 16 officers. The bedsteads were iron; the mattresses and pillows were filled with excelsior. On several of these barges there were operating rooms, pharmacies, bathrooms, and on some even chapels.

The Czarina maintained one of these barges from her own private



CARRYING PATIENTS ON DE CAUVILLE CAR, NEAR HIRSU.

PLACING SICK ON DE CAUVILLE CAR.

income. She paid the doctors and attendants, supplied all the equipment, and defrayed all the running expenses. On this barge there was 1 doctor, 4 sanitats, and 9 sisters (1 a nurse in operating room), 1 pharmacist, 1 housekeeper, and 6 nursing sisters.

During the first year of the war there was very little water in some of the streams near the troops, so, as far as transporting patients was concerned, not very much was accomplished, so use was made of these barges as floating hospitals.

Patients were brought to the Czarina's barge by the railroad. In all on this boat there were treated 1,100 cases. No cases of typhoid or dysentery were kept, however, because they would have infected the river water.

The water used on these barges was obtained from the river and was all filtered and then boiled before using.

The idea of using large barges instead of river boats was a very good one. The barges drew very little water, could be towed where needed by small steamers, all noise and dirt from the machinery was obviated, the wards were larger, and the ventilation was better than could have been had on a ship equipped to carry the same number of patients.

## CONVALESCENT CAMPS.

For the treatment of convalescents, on the outskirts of Harbin, on the railroad line, situated on high ground, and occupying about 200 acres of land, was what was called the convalescent camp. In the center was a street lined on either side by wooden houses of different sizes, but similar in construction. These buildings were for the doctors, nurses, canteens, churches, theaters, offices, etc. Back of these buildings on each side were two rows of barrack buildings constructed above ground, but covered with earth for protection against the cold. These barrack buildings were each 125 feet long, 40 feet wide, 15 feet high in the center, and 8 feet high at the sides. The ends of most were constructed of brick and were entered through vestibules. The rest of the building was wood. The roofs were wood, clinker built, and the floors of cement. The sides and roof were for the depth of a foot covered with a mixture of straw and black mud. This was allowed to harden and dry and was then covered with plaster, which had the effect of holding the nonconducting earth in place and also added to the neat appearance and warmth of the building.

The interior arrangements differed. In some buildings beds were used; in others, wooden platforms were built for the soldiers; in the center two platforms, one above the other, on the sides one platform. All the windows, of which there were six on a side and three at each end, were double. Four large Russian stoves, one in each corner, supplied the heat.

The small De Cauville railroad lines ran among the buildings, so that patients could be transported to any desired point.

There were several canteens run by different cities in this camp. At these stores the officers and soldiers could buy provisions and equipments at cost prices. These stores were of great convenience to all.

In all there were accommodations in this camp for 15,000 men. It could be and was used for barrack or hospital purposes. The mag-

nitude and completeness of this camp illustrated well the vast
rations necessary to conduct a modern war. The camp was r
city. A large water system was being installed by means of a
wells and a system of iron pipes. The streets and buildings w
be lighted by electricity. The sewage and refuse were all remo
carts. The whole sanitary condition of this place was excelle

The teeth of the officers and soldiers were looked after b
women dentists, who served as sisters and had offices in one
buildings. These women were regular graduate dentists an
kept busy morning and afternoon extracting and filling teeth.
was also a Red Cross dentist in Harbin. In Vladivostok, at the
hospital, a regular dentist was employed for the dental work
the sailors. Good dentists are rare in Russia, but the demand
to create the supply.

For the amusement of the soldiers in the convalescent camp
was a large theater, at which five performances and two concer
given during the week. These entertainments were much appr
by the men.

The convalescing soldiers that were sent to the camp did we
the expenditure of money by the Government for the erection
vast camp was fully justified. Many sick soldiers recuperated
camp and then returned to duty. If no such place had been av
for these cases, they would necessarily have blocked up the ho
and sanitary trains, and the services of many would have been l

When hostilities had ceased every bed in this camp was utili
housing soldiers that arrived from Russia on their way to the
so instead of a hospital it became a large barrack camp.

The work done by the military and Red Cross hospitals in Vla
tok was practically the same as that done in Harbin. The h
organization was the same. Vladivostok expected to be isolate
siege and made preparations accordingly.

The military and Red Cross hospitals had very little work to
preparations were made, as has been stated, to treat many tho
of sick and wounded. Vladivostok was solely a military and
town.

The Kauffman Red Cross hospital was situated in two large b
buildings beyond the town proper, near the head of the harbo
could accommodate 600 patients if necessary.

In charge of this hospital was an excellent surgeon, Doctor
During the last four months of the war there were treated in th
pital 760 cases. In all, 133 operations were performed, with 4 d
One died several days after an operation for removal of a cancer
sigmoid. The second case died of meningitis after a mastoid
tion. The third death was a case of suppurative peritonitis c
cating an attack of appendicitis. The fourth case was a deat
anthrax involving the parotid region.

Among the operations performed were the following: Twenty
ations for radical cure of hernia, 5 appendectomies, 1 remova
substernal goiter, 20 extirpations of glands of neck, 2 operati
osteomyelitis of tibia.

The other cases were cases of hemorrhoids, varicose veins, a
usual run of surgical cases that are found in public hospitals.

The operative work in this hospital was of a high order. A

ion of the Kocher operation for inguinal hernia was the one
d. Silk was the only ligature and suture material used, and
operative cases, according to the surgeon in charge, had
ithout suppuration.
s hospital there were 90 cases of scurvy under treatment.
iers about Vladivostok were isolated at times with their bat-
nd consequently food was not always delivered in sufficient

was an interesting case of gunshot wound of the chest in an
A Russian rifle was accidentally discharged by a soldier only
istant. The bullet pierced the second costal cartilage on the
e, perforated the lung, and made its exit near the upper and
gle of the scapula. There was very little shock; practically no
s coughed up. Bleeding from an intercostal artery near the
nd was the only complication. The exact distance the
e traveled before inflicting the wound and the piercing of the
rtilage and lung without symptoms are the interesting fea-
he case.
hospital there was a bacteriological laboratory in charge of a
ho only did this work. The laboratory was complete and in
order. Widal reactions were performed in all suspected
cases. In the wards was one case of para-typhoid (A). This
been diagnosed bacteriologically.
eneral health of the Russian soldiers as a whole was, consider-
exposure they were subjected to, very good. Typhoid and
y were the most formidable diseases that the doctors had to
with. No cases of bubonic plague or cholera developed
he army proper, nor were there any cases of beriberi. The
s of anthrax, typhus, smallpox, diphtheria, and measles were
dled, and no epidemic from these diseases occurred.

### REPORTS OF ARMY, GENERAL HEALTH CONDITIONS, PREVAILING DISEASES, GUNSHOT, SHELL, AND OTHER WOUNDS.

week a report of the health of the army was telegraphed to
by General Lienevitch, who obtained his data from the chief
al officer at Harbin. On August 11, 1905, the following tele-
s sent:

AJESTY THE CZAR:

| | | | |
|---|---|---|---|
| fficers | 52 | Typhus | 22 |
| | 975 | Dysentery | 418 |
| oldiers | 1,313 | Anthrax | 2 |
| | 24,047 | Variola | 21 |
| ver | 1,119 | Scurvy | 233 |
| typhoid | 32 | | |

he condition of the entire army. I have the honor to report to Your Majesty
nitary condition of the army, in spite of the rain and sicknesses of this time of
ry satisfactory.

GENERAL LINEVITCH.

year 1904 there were proportionately to the number of troops
ne same number of sick. The same diseases were prevalent
ars.

Fortunately for the Russians, there was no endemic malaria in Manchuria. The cases of malaria that developed were in men that had previously been infected.

From exposure to the wet and cold a number of cases of muscular rheumatism developed. These cases were mild in character and usually returned to duty.

Venereal diseases were less during 1905 than during 1904, as follows:

| | 1904. | 1905. |
|---|---|---|
| Syphilis | 2,867 | 1,600 |
| Chancroids, buboes, and gonorrhea | 5,756 | 3,276 |
| Total | 8,623 | 4,876 |

This may be explained by the fact that during 1905 the troops were farther from cities and Chinese villages than during the previous year. At the front in the positions there were practically no cases of venereal infection.

In Vladivostok all women of questionable character were put under police control and were examined by medical officers at regular intervals. Such that were found to be suffering from venereal infection were sent to a hospital established especially for the treatment of these cases. If the disease did not promptly respond to treatment infected persons were shipped out of the city. Owing to these measures very few men contracted venereal diseases.

On September 14, 1905, the total cases of sickness under treatment in the army east of Lake Baikal, as obtained from the statistical office, were:

| | | |
|---|---|---|
| Officers: | | |
| Wounded | 34 | |
| Sick | 1,129 | |
| | | 1,163 |
| Soldiers: | | |
| Wounded | 746 | |
| Sick | 30,035 | |
| | | 30,781 |
| Total | | 31,944 |

Among these cases were the following:

| | | | |
|---|---|---|---|
| Dysentery | 646 | Malaria | 559 |
| Typhoid fever | 5,287 | Anthrax | 1 |
| Recurring typhoid | 1 | Erysipelas | 41 |
| Undetermined typhoid | 115 | Scurvy | 104 |
| Typhus | 14 | Smallpox | 4 |
| Influenza | 1,089 | Measles | 4 |

Doctor Kosloskey, chief statistical officer, stated that the total number of sick admitted during the whole war was about 270,000, of which 18,830 died. He also stated that more died proportionately in 1904 than in 1905.

Consulting Surgeon Chervinsky of the Russian army, stationed in Vladivostok, gave the following official data of the health of the garrison of that place during 1904 and 1905:

| Cause. | January 1, 1904–5. | | January 1 to September 15, 1905. | |
|---|---|---|---|---|
| | Cases. | Deaths. | Cases. | Deaths. |
| Typhoid fever | 132 | 22 | 68 | 4 |
| Scurvy | 3 | ..... | 425 | ..... |
| Dysentery | 7 | ..... | 36 | 3 |
| Grippe | 223 | ..... | 422 | ..... |
| Syphilis | 128 | ..... | 215 | ..... |
| Enteritis | 204 | ..... | 663 | ..... |
| Diseases of lungs and thorax | 417 | 21 | 560 | 6 |
| Accidents and injuries | 165 | 2 | 321 | 2 |
| Diseases of the eye | 61 | ..... | 327 | ..... |
| Cutaneous diseases | 533 | ..... | (a) | (a) |
| Other diseases | 1,449 | 19 | (a) | 28 |
| Total | 3,664 | 64 | 7,107 | 43 |

a Not obtained.

| | |
|---|---|
| Average strength during 1904: | |
| Officers | 378 |
| Men | 19,006 |
| Average strength of garrisons, 1905 (sailors not included) | 66,000 |

It will be seen by the above table that the health of this garrison was most excellent. The men were encamped on hills with their batteries, and there was little communication between them. As the war progressed the general health of the troops improved. With a garrison of 19,000 men during the year 1904, there were but 64 deaths, and, with a garrison three times as large for nine and one-half months, during the latter part of the war, there were only 43 deaths from disease. From January 1 to September 15, 1905, there were but 68 cases of typhoid fever, with 4 deaths. Truly a wonderful record for an army exposed to a severe climate and living under war conditions.

A study of the cases of dysentery and typhoid fever that occurred in the army is most interesting and instructive.

The dysentery was, in the vast majority of cases, due to a Shiga bacillus infection. There were a few scattered cases, due to the Amœba dysentericus, probably 3 per cent of the total number.

As a rule, the Shiga dysentery was not severe. The whole course of the active symptoms, such as fever, bloody stools with mucus, accompanied by tenesmus, did not last longer than a week or ten days. After the dysentery had subsided many men remained in a weakened condition, necessitating transfer to the base hospitals. From here a certain proportion did not recover their vitality sufficiently to return to duty and was sent back to Russia. Most cases, however, did return to duty. The men affected by amœbic dysentery were almost always invalided home if they survived.

The following shows the number of cases of dysentery, Shiga and amœbic, all dysenteries being classed under one head by the Russians, that occurred among the whole army east of Lake Baikal in 1904:

| | | | |
|---|---|---|---|
| May | 0 | September | 1,300 |
| June | 350 | October | 900 |
| July | 400 | November | 500 |
| August | 2,000 | December | 200 |

Two per cent of these cases died.

During the year 1905 the percentage proportionately of cases to the number of troops was about the same.

Flies first became prevalent in June, and with the warm weather and rain increased until the cold nights in August.

Doctor Kosloskey was of the opinion that dysentery was primarily distributed by flies; secondly, the infection was by drinking water. This view seems to be the correct one. During the summer months the flies had many opportunities to distribute the germs that produced dysentery from the sinks, which have already been described.

In Vladivostok, which was on the seacoast, with summer climate colder than that of Manchuria, there were few flies during the summer months. In 1904 but seven cases of dysentery, and in the summer of 1905, with a garrison of 66,000 men, but 36 cases occurred.

The water supply of Vladivostok was less liable to infection than it was in the flatter Manchurian country; but the appearance of dysentery, along with the appearance of the flies in both years of the war, with the water supply a constant quantity, seems to point conclusively to the fly transmission as being the principal manner in which the disease was spread.

During the same period of time, from June through the summer and well into the fall, typhoid fever made its appearance among practically the whole army, with the exception of the troops about Vladivostok.

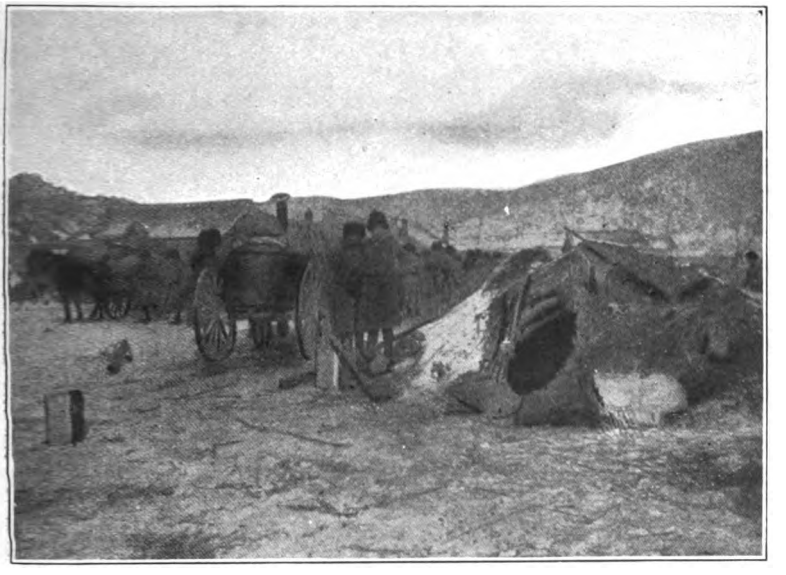
Typhoid fever has been endemic in a mild way among the Chinese in Manchuria for some time. Undoubtedly the troops brought a new infection from Russia, for all along the Trans-Siberian Railway cases developed.

The closets at some of the stations were filthy, and very little attempt was made to keep them clean. Men passing on trains, even if they drank no unboiled water, ran the risk of having their bread infected by flies, and so were infected before they arrived at the front. During the last week in August, 1905, 49 such cases were admitted to the hospitals. Infected men thus found their way into the different camps. Where the disease was mild, the men affected were constantly depositing typhoid germs in the sinks, and often on the open ground.

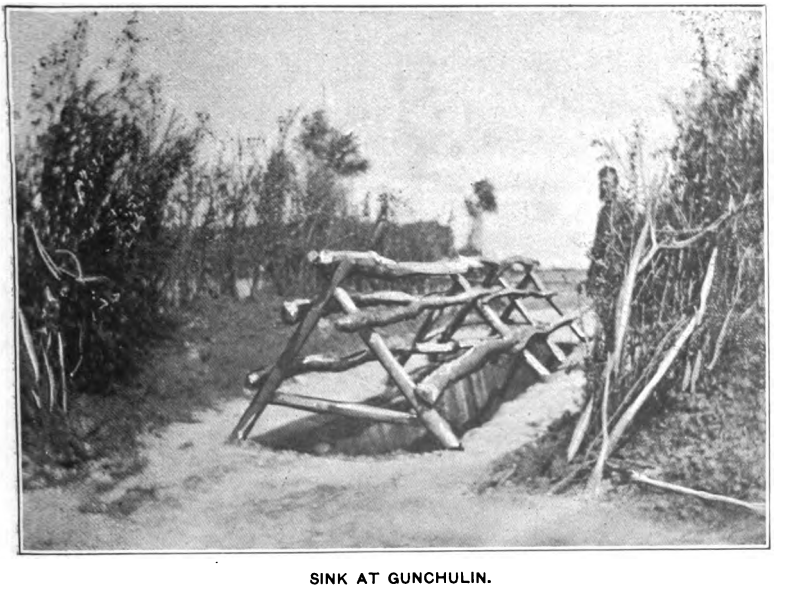
The ground proper of the camps was infected undoubtedly by the urine of men suffering with typhoid fever. No urine tubs were used by the Russians, and consequently the soldiers very often at night urinated directly on the ground in the vicinity of their camps. In the light of our present knowledge about the presence of typhoid germs in the urine of a large per cent of all cases, and the persistence of germs in this secretion, it can readily be seen that one avenue by which the infective organism of typhoid fever was disseminated was left wide open.

There were a number of mild cases in the various camps, for men were often admitted to the hospitals in the second and third weeks of the disease. Infection was spread by the lack of sanitary precaution connected with the sinks; also, the soldiers drank water from infected streams and wells without taking the precaution of boiling it.

The Russian soldiers also must have spread the typhoid germs by direct contact of the hands with infected stools. For instance, a man in the beginning of a case of typhoid fever, or one suffering with a mild attack, would accumulate the germs on his fingers, not being provided with toilet paper, from contact with the infected bowel excretion.



RUSSIAN CAMP DUGOUTS IN WINTER.



SINK AT GUNCHULIN.

These hands were washed only at long intervals. He would then unconsciously transfer these germs to the bread he was eating with others, or a spade or other implement that would be handled by his companions, so, following the possible modes of the direct transmission of the germ, it was easy to see how it was disseminated.

During the summer months, when the ground was dry, the earth became pulverized, and, in the presence of any wind, dust was blown in clouds over everything. Undoubtedly the typhoid germs deposited in this dust were disseminated with it.

The soldiers and the native Chinese directly infected the water in many of the streams, also the wells, by depositing excreta on the watersheds. The surface drainage was further infected by the Chinese, who disposed of their dead, including those that died of typhoid fever, by placing the bodies in uncovered coffins on the ground, or, when wood was not available, to make a coffin, would simply place the body on the ground and cover it with a little earth. So the water, in most of the streams at least, could be looked upon with great suspicion.

That typhoid fever did not spread more than it did was due to the fact that a great deal of the water used by the troops was boiled and drank in the form of tea. Practically all the food eaten was rendered sterile by cooking. Most of the wells were covered and guarded. The men were naturally strong and possessed of good physiques. The number of typhoid cases could have been reduced materially by an early recognition of the disease in the camps, by constructing the sinks and treating them in a hygienic manner, and by regarding all fecal and urinary deposits as dangerous and infected matter, by immediately moving camps in which cases of typhoid developed to new sites whenever practicable, by screening all kitchens and places where the bread was stored so as to keep it away from contact with flies, and by insisting on the troops drinking boiled water at all times. All infected matter from typhoid cases should have been carefully collected and rendered harmless during the process of transportation of the typhoid cases to the base hospitals. It would have been better to have looked upon typhoid fever as a contagious disease and to have kept all cases isolated.

During 1905 most of the typhoid cases developed among the second army, which was situated near the railroad. The first army, on the left wing of the lines, situated in hilly country, supplied the next number. The best showing was made by the third army, on the right wing, which was encamped on level ground.

The following charts show the number of cases in 1904 and 1905 under treatment:

1904.

| | | | |
|---|---|---|---|
| June 1, less than | 10 | October 15 | 4,350 |
| July 1 | 100 | October 15, active army | 3,700 |
| August 1 | 400 | November 1 | 3,400 |
| September 1 | 2,000 | December 1 | 2,100 |
| October 1 | 4,100 | December 31 | 900 |

1905.

| | | | |
|---|---|---|---|
| July 8 | 800 | August 23 | 4,400 |
| July 23 | 1,500 | September 1 | 5,287 |
| August 1 | 2,400 | September 29 | 5,895 |
| August 15 | 3,500 | | |

The total number of typhoid fever cases admitted from t
ning of the war to September 14, 1905, was 17,033, of whic
2,077 ended fatally, a little over 12 per cent.

There were in all probability a number of additional cases
not correctly diagnosed. The Russians naturally did no
swell their list of typhoids, so typical cases and many mild c
tabulated with diagnoses of entero-colitis, malaria, and influ

The typhoid was severe in type and almost always disabl
from the further performance of duty in the field for severa
so convalescent cases were sent back to Russia to recuperate.

It will be seen by the above charts that dysentery began t
with the disappearance of the flies, but that typhoid cases
to occur well into the fall months. This can be explained
in part by the fact that the incubation period of typhoi
longer than that of dysentery. The germ of typhoid posse
resistance and lives longer under adverse conditions than
Shiga bacillus, and once having established a good foothold i
supply is harder to get rid of.

The ground about the camps, too, was infected by urine c
the typhoid organisms more than it was by dysenteric deposi

The following data was obtained from Doctor Koslosk
statistical officer:

Total number of killed and wounded, from the beginning of the war until Septem
exclusive of Port Arthur:

| | |
|---|---|
| Officers— | |
| Killed | |
| Wounded | |
| Men— | |
| Killed | |
| Wounded | |

This does not include wounded and captured. Of these 2
and 3,340 men died shortly after receipt of wounds.

| | |
|---|---|
| Missing: | |
| Officers | |
| Men | |

At least one-half, probably three-fourths, of these were
that the total number of officers and men killed was—

| | |
|---|---|
| Officers | |
| Three-fourths of 421 officers missing | |
| Men killed | |
| Three-fourths of 39,308 men missing | |
| Total number killed | |

Adding to this 20 officers and 3,340 men who died of thei
in transit, we have 52,623 officers and men killed or died f
wounds.

The total number of deaths from disease for the same
time was but 18,830, or, speaking roughly, 1 man died of dis
that died of wounds. If all the missing were counted as de
the number of remote deaths from wounds, including those
into the hands of the Japanese, were counted in the above lis
portion of dead from disease to dead of wounds would be
A most excellent record, unexcelled in any war.

During this war there were—

| | Per cent. |
|---|---|
| Of total forces engaged actually killed | 0.55 |
| Of total forces engaged missing | 1.1 |
| Of total forces engaged wounded | 3.3 |
| Total casualties | 4.9 |

For comparison, in the Franco-German war there were—

| | Per cent. |
|---|---|
| Of total forces engaged actually killed | 0.75 |
| Of total forces engaged missing | .5 |
| Of total forces engaged wounded | 2.5 |
| Total casualties | 3.75 |

The Russians divide the wounds received in warfare under two heads—"fire wounds" and "cold wounds." The "fire wounds" embraced those caused by rifles, pistols, and shrapnel. The "cold wounds" are made by sabers and bayonets.

The percentage of these wounds were as follows:

| | Per cent. |
|---|---|
| Fire wounds: | |
| Officers— | |
| Rifles | 71 |
| Shells | 18 |
| Shrapnel | 11 |
| Soldiers— | |
| Rifles | 79 |
| Shells | 8 |
| Shrapnel | 13 |
| Cold wounds: | |
| Sabers in case of soldiers | 17 |
| Bayonets in case of soldiers | 83 |

Bayonets and sabers, practically none in case of officers.

In every 1,000 wounds there were not more than 15 or 20 saber or bayonet wounds.

In all there were 250 cases of tetanus, 87 per cent of which died—1 case of tetanus to 550 wounded.

There were a few pistol wounds, also wounds inflicted by hand grenades, but these were so few as not to alter the above percentages. When the soldiers got close enough to use pistols and bayonets the wounded were killed in the majority of instances. There were a number of bayonet conflicts between the Russians and Japanese. The Russians, being larger and stronger than the Japanese and provided with longer bayonets, if the forces were anywhere nearly equal, usually got the better of these little encounters.

Among the thousands who were killed and wounded every portion of the human body was subjected to injury by small projectiles, pieces of shell, shrapnel, bayonets, or sabers. Some men were frightfully wounded, yet continued to live. Other men with wounds not so severe succumbed. The personal equation of individual resistance entered into the final outcome of the case. The element of shock, the attention received after being wounded in the way of nourishment, were often vital factors in the determination of fatal and nonfatal wounds.

The Japanese were armed with two rifles—the new "Arisaka" or "Meidji," caliber 6.5 mm., which was used by the regular troops, and the old "Murata" rifle, which had larger caliber, 8 mm., and was used

by some of the reserves. The projectile fired by the first rifle was smaller and incased in a stronger jacket than that of the old one. It was easy to differentiate the wounds inflicted by these respective rifles.

The Meidji rifle, having a much higher muzzle velocity, inflicted clean, piercing wounds at distances where the bullets fired from the Murata rifle would tear and lacerate. The strong jacket of the small new projectile was seldom torn away from its leaden body unless it had struck a rock or other object and ricochetted.

The jacket of the Murata bullet is made of a copper composition and tears on contact with any hard substance such as bone. The jacket may become distorted and split by the mere passage of the bullet through soft tissues. This bullet then made larger and more complicated wounds than the Meidji, and the effects of the passage of the projectile through the different tissues were those of a lead bullet plus the complications produced by pieces of a sharp jacket attached to and detached from the bullet proper. Clean, perforating wounds of the soft tissues were made at close ranges by the old rifle. Usually, however, the jacket tore, and the wound was ragged and contused and became infected very easily.

An example of the typical effects of the passage of one of these bullets through soft tissues was seen in military hospital No. 1 in Harbin. A soldier was shot through both thighs from left to right at a distance of 200 yards. The bullet passed through the left thigh behind the femur, producing a clean, perforating wound which healed without suppuration. The jacket of the bullet split on entering the right thigh, and the bullet revolving with its projecting jacket tore through the adductor muscles, just missed the femoral artery and vein, and came out through the quadriceps, making a nasty contused wound throughout. This wound was infected on admission to the hospital and was slow in healing.

The old Murata rifle was used in the China war of 1894–95 by the Japanese. The wounds inflicted on the Chinese were very much more severe than those produced by the new rifles and, as a rule, were badly infected from the start.

The Russian rifle is uniform in type—caliber is 7.62 mm. (0.300 inch)—and larger than the Japanese Meidji. The character of the wounds are much the same as those produced by the Meidji, except that the wounds are more severe, especially where bone is implicated.

The Russian projectile weighs 13.7 grams and leaves the rifle with a velocity of 640 meters per second. The Meidji bullet weighs 10.5 grams and starts from the rifle with a velocity of 725 meters a second.

The Russian bullet is 1.12 mm. thicker than the Japanese; consequently tissues are more disturbed by the greater resistance presented to the larger object as it passes; more lateral force is transmitted to the immediate structures penetrated. The Japanese projectile, being so small, when nonresistant elastic tissues are involved at mid ranges tends to simulate the effects that would be produced by passing a large needle through the tissues.

The effects of bullets at different ranges is exceedingly hard to determine, for men when fighting endeavor to conceal themselves, and it is hard to determine exactly at what range the individual soldiers are wounded, conditions so often change quickly.

During this war there was a great deal of close fighting, under 500 yards. Many of the wounds were received at even 200 yards. The Japanese bullets even at these ranges did not produce the amount of damage that was expected. Many wounds received at much closer ranges presented the characteristics of wounds received at 600 or 800 yards. The progress of bullets was often impeded by passage through fields of kaoliang or other grain. The moist weather may have had some effect on the smokeless powder and caused it to lose some of its power.

A large percentage of the deaths on the battlefield was due to wounds of the head. Men when intrenched necessarily exposed this portion of their bodies. At short ranges small projectiles passing through the cranial vault shattered the skull and disorganized the brain. Perforating wounds began to occur at 400 to 500 yards.

Small projectile wounds of the body involving the spinal canal were very fatal.

Wounds of the chest occurred very frequently; the lungs were perforated time and again with very few symptoms. At close ranges there was very little splintering of the ribs; these bones are spongy, elastic, and not fixed, so offer very few advantages for splintering. The lungs being full of air and elastic could be perforated with very little damage unless a blood vessel were implicated, so little solid substance, comparatively speaking, came in contact with the penetrating bullets.

Wounds of the heart and large blood vessels were, of course, fatal. Recoveries were the exceptions.

Abdomens, with contained viscera, were perforated in all directions. Here, too, the Japanese bullets surprised the medical men by their humanity. At very close ranges, say under 200 yards, these wounds were very fatal, but soon after that distance had been passed cases began to recover. These wounds presented, in addition to the symptoms of the intestinal perforation, which at times were exceedingly slight, the symptoms produced by injury to the different viscera implicated, viz, the liver, gall bladder, stomach, spleen, pancreas, kidneys, and bladder. A diagnosis of the viscera perforated could often be made anatomically. Hemorrhage from the spleen and large abdominal vessels was a very fatal complication. Those so wounded rarely left the battlefield. Wounds also of the gall bladder and bladder proper, unless operated upon quickly, were followed by peritonitis and death.

Men wounded through the abdomen when the stomach and intestines were empty made better recoveries than those whose stomachs or intestines were not. The explanation of this is self-evident.

Wounds of the liver were complicated many times by wounds of the right pleural cavity. These wounds very often were infected, and required operative procedures to establish drainage.

A number of localized abdominal abscesses occurred after perforating wounds of the abdomen by small bullets, in which the external wounds healed asceptically. From one to three weeks after injury symptoms of a local collection of pus became manifest. The most plausible explanation of the occurrence of these abscesses is that a local peritonitis is set up by matter, which escapes at the point of the intestinal perforation. Many times when the intestine is punctured

the mucus membrane rolls into the wound and a plastic exudate from the serous coat prevents further leakage, but the rent in the intestine may be too large for this to occur, or there may be other conditions, such as a full intestine, that prevents this happy termination. Simple evacuation of these abscesses through the abdominal wall or through the bowel may effect a cure. Many times, however, there develops a chronic plastic peritonitis in which the intestines and mesentery become matted together. The prognosis in these cases is extremely bad, for they almost all succumb to the results of an intestinal obstruction or die from chronic sepsis and exhaustion.

Consulting Surgeon Chirbinsky stated that he had seen over one hundred such cases. All methods of treatment had failed, and he was at a loss to know what to do that would be of benefit..

Many of the small bullet wounds were complicated by bone and joint injuries. At close ranges, in the large, hard bones many cases of bad splintering were seen; at close ranges, too, the soft cancellated bone was fractured into the joint proper and produced a serious wound. Many bones were perforated and grooved; especially was this true of the soft bones. Case after case of a joint perforation by small projectiles that healed without complication were seen. These wounds occurred at mid ranges, estimated by some as between 500 and 1,500 meters. When these cases were not infected, conservative treatment yielded wonderful results. On the other hand, there were a number of serious suppurative-joint cases. These all required operative procedure. Many recovered with useful members.

The whole tendency of modern surgery is to save if possible. Certain it is, if the conservative treatment of a badly infected knee joint, for example, with discharging sinuses necessitating many incisions and an ultimate stiff, painful, useless leg, and all the dangers that accompany a long state of suppuration, often ending in a state of chronic invalidism, were weighed against the more radical operation of immediate amputation, resulting in a quick convalescence with no such dangers, surgeons would hesitate more before they determined to make all efforts to save something for the mere sake of saving, and would consider more the future of the case.

Many cases in which long bones were badly splintered and pulverized by bullets made excellent recoveries if the main nerves and vessels remained intact and if the wounds remained asceptic and the damaged parts were properly immobilized.

It was often surprising to see the recuperative power of damaged bones when treated by rational surgical procedures other than operative ones. The whole result depended usually on whether or not a case were infected. If infected, the splinters and bone dust that were harmless in the noninfective cases became irritating foreign bodies, and before a cure could be effected required removal.

Arteries and veins suffered many times by passing bullets. Many were cut cleanly across, others were partly cut, and still others suffered contusions or lacerations of their outer coats by transmitted force from a passing bullet or from splinters of bone. Those cases in which a small bullet punctured or partially cut a large blood vessel often died on the battlefield. When the arteries were completely severed, enabling them to contract and so arrest hemorrhage, little damage was done. Cases in which the outer coats of the arteries had been dam-

aged developed many times aneurismal sacs at the side of injury, necessitating operative treatment.

Secondary hemorrhages occurred occasionally in infected cases where the tissues had been badly damaged, also in wounded that were suffering from scurvy.

Injuries were inflicted by small projectiles to the central and peripheral nervous systems at almost all points. The brain was pierced at mid and at long ranges many times. If the sinuses and blood vessels remained uninjured and if injury to the brain proper was not severe, these cases, if not infected, and if properly handled recovered sometimes without symptoms, sometimes with loss of function of some cranial nerve that had been severed or injured by the bullet.

There were many injuries of the spinal cord and of the nerves that take their origin from that source. The different plexuses and nerves proper were likewise often damaged or cut. Immediate symptoms of uncomplicated nerve injuries were paralysis, and if sensory fibers were contained, loss of sensation to the parts supplied. Nerves were not only damaged by the bullets proper, but also by splinters of bone acting as secondary missiles. A number of cases of severed nerves were sutured successfully. Some of the nerve cases presented all symptoms of a complete severance of the continuity of the nerve, but when the structure was exposed by an incision nothing more, microscopically, than a congestion was found. The function of the nerve in many of these cases returned in the course of time; in others there was a degeneration of the nerve proper, with its accompanying manifestations.

Nerves were caught in callus in the process of the healing of some fractures, also in cicatricial tissue. Operative procedures were necessarily resorted to. There were a few cases of intense neuralgia following nerve injury. One such of sciatic neuralgia was seen in military hospital No. 1. The man had been shot through the thigh; a fractured femur had united in good position, the nerve was exposed by an incision and was found free from any pressure by bone or cicatricial tissue. The man prayed to have the leg amputated on account of the pain.

The cases in which nerves were cut that made the best recoveries were those that were operated upon early. When there had been delay the distal part of the nerve underwent degenerative changes and naturally did not present as favorable a surface for primary union to its proximal portion as it would have done earlier.

The Japanese used large naval guns, as well as ordinary field pieces, in their operations against the Russians. The commonest forms of shell were the Shimose and the shrapnel shells. The Shimose shells exploded on contact, and on some were adjusted time fuses. The shrapnel shells were filled with leaden bullets, and were exploded while in the air by means of time fuses. The Shimose shell burst into very fine pieces, which lost their power of penetration very soon, so the effective area of these shells was not very great. The soldiers within a few feet of one of these exploding shells were often torn to pieces, but men at a distance of 10 paces were not very severely injured, as a rule. The fumes from these shells that exploded in the open air were disagreeable, but not poisonous. Each shrapnel shell contained about twenty leaden bullets, each weighing about an ounce. They were so placed that when the shell exploded they went downward and

forward. These shells made at times frightful wounds. Often a man would be torn by several of the leaden missiles, as well as by portions of the iron shell.

As has been stated before, of all officers wounded, 11 per cent were by shrapnel and 18 per cent by shells, and of the men 13 per cent were wounded by shrapnel and 8 per cent by shells. These wounds were far more serious than those produced by the small projectile, and approached the wounds seen on shipboard.

The badly wounded were usually considerably shocked. The contused lacerating wounds did not, as a rule, bleed; but the devitalized tissues were easily infected, so the surgery of this class of cases was usually the surgery of pus cases. Many poor maimed cripples now throughout Russia bear testimony as to the effectiveness of these missiles in causing permanent disabilities.

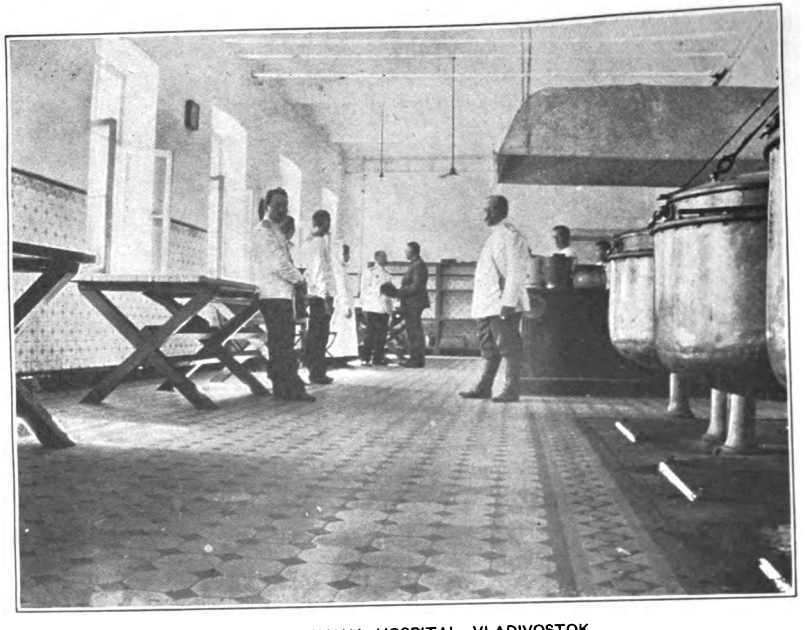
Hand bombs that were about the size of a large orange and so made as to explode on contact were used by both the Japanese and Russians with the same general results as those seen from the explosion of larger shells. When the fighting got so close that these could be thrown into one another's trenches, those lightly wounded were usually wounded more severely before the engagement was over.

Of the total number of wounds there were about 1.75 per cent inflicted by bayonets or sabers. These presented symptoms of the parts involved.

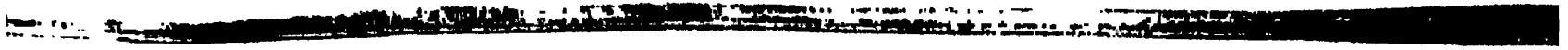
The Russian cossacks were very adept in using their swords, also, according to the Russian officers, were more proficient than the Japanese in the use of their bayonets. That there should have been any such percentage of sword and bayonet wounds is a remarkable feature of the war. Both sides were armed with modern rifles, machine guns, field pieces, etc., all intended to render the approach of an enemy impossible; but, as a matter of fact, night, the character of the country, protecting fields of grain, and, not least, the courage and roused fighting spirits of both sides, made this character of fighting possible. Men were stabbed over and over again in these charges; many died. Stab wounds by the Japanese broad bayonet through the chest and abdomen were very fatal. The blade was large enough to sever the blood vessels. The narrower Russian blade, unless it reached a vital spot, comparatively did not do the same amount of damage, but, nevertheless, was a very efficient instrument of death. Most of the bayonet wounds treated were of the extremities, and usually healed without any trouble, as bones were rarely involved.

The sword wounds involved, as a rule, the upper extremities and the head. A number of the head cases presented fractures of the skull. If they were clean-cut, and did not become infected, they did well.

A Russian officer in Harbin presented a good example of what a soldier may endure and still live. In one engagement he was struck by a piece of shell on the head and sustained a compound fracture. He was sent to a hospital, operated upon, recovered, and returned to his regiment. Later he was stabbed through the palm of his right hand in a charge. This healed rapidly. In still another engagement he was shot by a small projectile through the abdomen. He soon recovered from this, rejoined his regiment, and was ready to try his luck again, when peace was declared, much to his disappointment.



KITCHEN, NAVAL HOSPITAL, VLADIVOSTOK.



## DISPOSITION OF THE DEAD.

After engagements, if the Russians still held the positions, the dead were gathered together, the bodies were identified, if possible, a record made, and the bodies buried in large pits. The burial services were conducted by the priests in a most impressive manner. Many of the dead were left on the battlefields to be disposed of by the Japanese.

Near each village or city throughout Siberia and Manchuria there were a series of cemeteries in which soldiers that had died of their wounds or from sickness were buried. The graves were usually dug 5 or 6 feet deep. The body of the dead soldier was escorted to the grave by a detachment of soldiers. Here a priest held the burial services, the body was covered, and a final salute from the soldier's companions ended his career on earth.

It was impossible to obtain wood to construct coffins at all times, so many soldiers were buried in coffins made of interlaced boughs of trees. The bodies of others were simply lowered into the graves without the protection of a coffin of any description.

The graves of individual soldiers were usually marked by wooden crosses about 4 feet high. The name and other data pertaining to the soldier was sometimes written on the wooden cross by a lead pencil. Sometimes it was painted on. Sometimes the sisters burned the name into the wood. Some graves were marked by a piece of tin, on which the name had been indented.

There was no systematic method of marking the soldiers' graves. Soon many of the identification marks will be destroyed, and it will be impossible to locate the different graves.

Officers were always buried with elaborate funeral services when opportunity presented. Many times their bodies were sent back to Russia in special cars. When a body was transported on the railroad, the coffin was placed in a sealed zinc casing. Officers' graves were generally well marked by tombstones in the cemeteries back from the fighting lines. When officers died on the battlefield, their bodies met the same fate as those of the soldiers.

## PENSIONS.

The disabled and crippled Russian soldiers do not receive pensions enough to enable them to live. It was a common custom among the Russian officers to take up subscriptions for the families of the dead soldiers of the different regiments. Many of the wealthy officers cared for the disabled and crippled soldiers of their immediate command.

The Government supplied in St. Petersburg and Moscow artificial limbs of a very good quality to all those that needed them.

Totally disabled men should get from the Government a pension from the invalid capital fund about $120 a year. Those soldiers who have been injured and not totally disabled should receive $60 a year pension. All cases are decided by the pension commissioners, and, as a matter of fact, very few men receive the pension of $120.

If a man has a St. George decoration, he is entitled to a little more pension than his companions similarly disabled who have none.

Noncommissioned officers receive a lump sum after ten years and again after fifteen years of service in place of an actual pension.

The pensions of officers are placed on a substantial footing. There are two kinds, State and the Emerital pensions. The State pension advances according to the rank and length of service of the individual officer. The Emerital pension comes from a fund which is raised by taking 6 per cent of all officers' salaries. A yearly pension is only paid if the officer has completed twenty-five years of service. The amount increases with the rank. If a pension is paid before the twenty-five years of service have expired, a lump sum is paid to the individual. A widow receives a half, and the children a quarter, of the total amount paid in by the deceased officer. Special pensions are sometimes given by the Government to those that have performed special duty in a distant region.

The retired pay of officers varies according to rank and service.

The Alexander committee was founded by the Emperor Alexander I, and has for its object the helping of invalided officers and men. Three classes of beneficiaries are recognized: First, total invalids; second, those who can do a little work, and, third, those who are not seriously incapacitated for work. These may go up to the second and first class. Widows and children of officers and men are also given aid by this society.

The funds are raised by proceeds from concerts and entertainments, by all increase of the officers' salaries for the first three months after promotion, and by the interest on the original fund deposited by Alexander I.

This society does a great deal of good, but after this war the Government itself should properly pension all deserving men.

### MEDICAL ORGANIZATION OF THE NAVY.

The medical organization of the navy is very similar to that of the army. In all, there are 340 medical officers, each one of whom, after successfully passing the entrance examination, has been appointed as an assistant surgeon in the navy by the minister of marine after completing his medical course at the Government medical school at St. Petersburg.

The position proper of the medical officers in the Russian navy is on a better footing than it is in the army. The medical officers are placed in command of all the naval hospitals; they are better paid, and, in fact, occupy about the same relative positions in the Russian navy as our medical men do in our Navy, with the exception that they have relative instead of actual rank.

Medical officers in the navy are designated as assistant surgeons, surgeons, fleet and staff surgeons. A medical inspector-general, with the relative rank of major-general, is at the head of the corps, and corresponds to our Surgeon-General.

Doctors enter the navy with the "chin" rank of "titular-rath," which corresponds to a captain in the army. Four years are spent in this grade, when appointment is made, without examination, as are also all subsequent promotions, to the grade of "collegian assessor," which corresponds to a major in the army. At the end of three years more another promotion to the grade of "hoff-rath" (lieutenant-colonel) occurs. Four years are spent in this grade, and also in the next higher grade, "collegian-rath," when the grade of fleet surgeon is attained. Fleet surgeons have the relative rank of a

CORRIDOR, NAVAL HOSPITAL, VLADIVOSTOK.

full colonel in the army. The senior ten of the corps have the "chin" rank of "wirklicher-statts-rath," which corresponds to a major-general.

The feldschers in the navy take a course in the naval school for feldschers at Kronstadt before they are detailed for duty. As a class they are better educated than the feldschers in the army.

The sanitats are detailed from the crew in the proportion of one sanitat to 100 men of the crew.

Female nurses are employed in all the naval hospitals and were also employed on all the hospital ships during the war. These women were mostly graduate nurses and belonged to the Red Cross society, and were detailed by that society to fill the different nursing positions. If at any time a nurse became unsatisfactory she was discharged by the medical officer in command of the hospital and replaced by another nurse supplied by the same Red Cross organization. In this manner it was possible to keep all the hospitals supplied with excellent nurses.

The apothecary officers are obtained from the same source as are those appointed to the army, and are consequently about the same class of men.

### RUSSIAN NAVAL HOSPITALS.

In all, there are six naval hospitals maintained by Russia in the following places: St. Petersburg, Kronstadt, Sevastopol, Vladivostok, Libau, and Nikolias. These hospitals are all modern in construction and equipment.

Of all the hospitals seen in Manchuria and Siberia the naval hospital at Vladivostok is the best. It is a permanent hospital, and its construction has been gradual and on lines to meet requirements. Vladivostok is the principal Russian naval base in the East. There is a large navy-yard, naval barracks, a large dry dock, naval storehouses, and always a number of naval vessels in port.

The hospital is nicely situated on a 12-acre plot of ground on the sloping side of a hill facing the bay. The grounds are surrounded by a large brick wall. Medical Inspector Rontchevsky has been in charge of this hospital for the past four years. The medical personnel consists of a medical officer in command and nine assistants. Ordinarily there are but six assistants. Each doctor has his own wards or special work assigned him by the chief medical officer. Twelve female nurses, called sisters, with two sanitats for each ward, attended to all the nursing of the patients.

The organization of this hospital differed from ours in the presence of "intendant" and "apothecary" officers and female nurses. The duties of the intendant officer, who had a "chin" rank corresponding to a major, were those of manager, so to speak. He buys supplies, has charge of the books, and attends to the business details of running the hospital. He is in no way connected with any other duty. The apothecary officers are immediately under the medical officer in command.

Funds for running the hospital and making improvements are obtained directly on request of the medical officer in command to the minister of marine and are without limit.

The employees of the navy-yard in Vladivostok have the privilege of the hospital for treatment as well as the personnel of the navy.

When Doctor Rontchevsky assumed charge the hospital wards were situated in wooden buildings. These have all been torn down

and replaced, except two small buildings, one of which is used for venereal diseases and the other eye and ear cases.

The buildings are large, substantially built, the brick walls being 2½ feet thick. The buildings are plastered and painted white. The main hospital building is a two-storied structure facing southeast. At the eastern end are situated the dispensary, pharmacy, a dental office, and the administration room.

From the front of the building three wings project. In these are situated the large wards, 56 feet long by 27 feet wide. In each are 22 beds. In the back of the building are a number of wards containing 10 beds each. In all, this hospital can accommodate 434 patients.

At the west end of the building are situated, on the first floor, five rooms for officers, each room containing two beds. Above these rooms, on the second story, are similar rooms for the treatment of officers and sailors' wives. One room is reserved for maternity cases. Two women attendants keep these rooms in order and assist the nurses. There is a small diet kitchen connected with each of these sets of quarters.

The floors of the hospital are asphalt, the beds are the modern iron ones with wire springs, the bedding, mattresses, and clothing supplied to the sick are of excellent quality and are kept clean.

The operating room is situated on the second floor in one of the wings. The light is good. It is very clean. The operating table, instruments, sterilizers, etc., were all modern and in good order.

Near the operating room are two small wards, each containing four beds. After operations cases are kept in these rooms for four or five days and then removed to a surgical ward for clean cases.

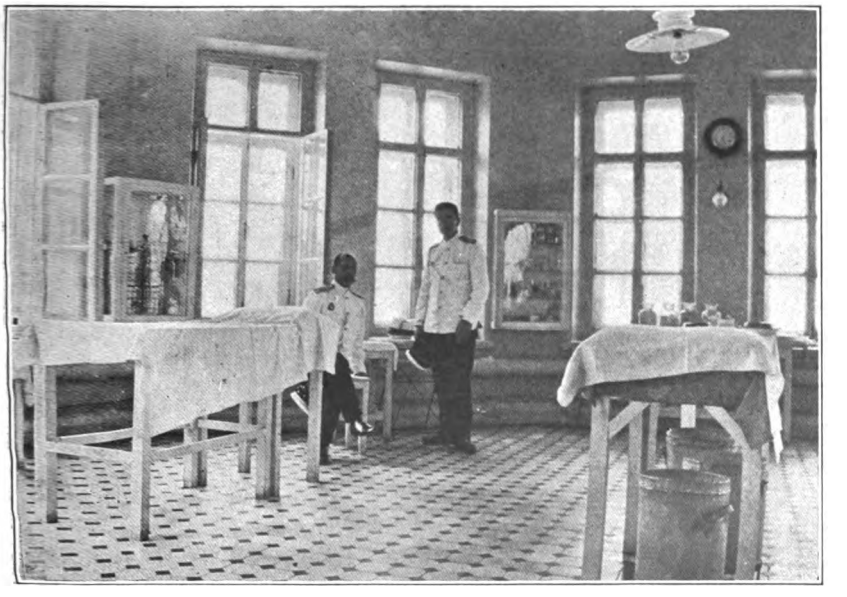
The pus cases are operated upon in what is known as a dressing room, which is on the first floor, situated in a small circular pavilion, which projects from the rear of the main building. In this room there are three tables. Two nurses are on duty here continually and do not come in contact with the clean cases. The pus cases are brought to this room when necessary and dressed. Soiled dressings are thrown down a chute which leads into a box at the side of the building. This is emptied every morning and the dressings burned.

In a large two-story building immediately back of the main hospital building are situated steam and electric plants for supplying heat and light to the several buildings. In this building are also situated a kitchen, bakery, and the laundry.

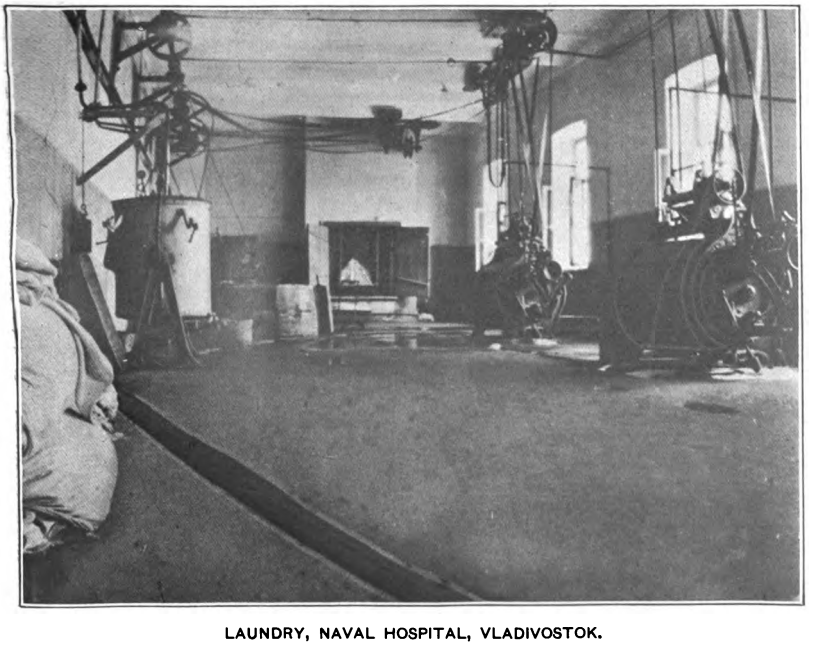
The kitchen is 60 feet long by 20 feet wide; the floors and sides are tiled; there is a large stove and four large copper retorts for making soup, which are heated by steam. In charge of the kitchen is a sister, and under her were two Chinese cooks and several helpers.

The bakery is back of the kitchen. Two Russian bakers make black and white bread for all the patients and personnel.

Two meals are served to the patients daily, the first at 11 a. m. and the second at 5 p. m. The meals are always inspected by the medical officer in command of the hospital. Usually there are three soups—one a light chicken, the second a vegetable, the third is the regular soup that is served to the soldiers—a white buckwheat pudding, a white and black bread. The diet of each patient is ordered by the doctor in charge of the case. A regular diet sheet is made out daily for the use of the cook.



DRESSING ROOM, NAVAL HOSPITAL, VLADIVOSTOK.



LAUNDRY, NAVAL HOSPITAL, VLADIVOSTOK.

The laundry is in the same building. The clothes are boiled in hot water and then put in washing machines, of which there are two, made by Deadford & Co., of Manchester and London. Water is removed from the clothes by placing them in a copper retort, which revolves rapidly by means of steam. From here the washing is sent up to a steam drying room by an elevator; the clothes are then hung on racks. A clock arrangement on each rack designates the time the clothes will be dry enough to remove.

In this building is also situated a steam plant and a hot-water system, which supplies heat to the different buildings.

Near the last-described building is the storehouse. In this are two apothecary officers and the apothecary Feldschers on duty. Large quantities of medicines, surgical supplies, etc., were stored here, not only for the use of the hospital, but also for the ships in the harbor. In this building there are two laboratories for chemical research.

There is a small building used as a deadhouse and a church back of the storehouse.

The venereal patients are quartered in a wooden building which had accommodations for 80. A new brick building for these cases is now nearing completion. In the syphilitic ward each man has his separate mess gear and a little bag for keeping his bread at the head of the bed.

The eye and ear wards are in a low wooden building; each ward contains 28 beds. The doctor in charge of these wards has made a special study of this subject and operates on cataracts and performs all the eye and ear operations. Knapps's roller forceps were used in the treatment of cases of trachoma.

The isolation building is of the same architecture as the rest and is built on the most modern lines. It is so arranged that there are three noncommunicating sets of rooms, one large compartment and two smaller ones. Each is provided with its own wards, rooms for nurses, kitchen, bathrooms, and closets and is entered from the outside. The floors of the building are tiled, and the rooms can each be made air-tight and disinfected by formalin. The large compartment contains one large ward, 30 by 26 feet, and two rooms with four beds each. The smaller suites contain one small ward containing ten beds and one room for a nurse.

With this arrangement different diseases can be treated in different rooms. Cases can be placed in a ward for observation, and convalescent cases can be removed from infecting ones previous to discharge.

For the amusement of the men Doctor Rontchevsky has fixed up billiard tables and a theater in a wooden building. Entertainments are given usually once a week by officers, officers' wives, and others that are musical or can in any other manner entertain the sailors. Needless to say, these performances are attended by all the sailors that are able and are much appreciated.

Separate buildings are in the course of construction for the medical officers and nurses.

The female nurses are obtained from the Red Cross Society, whose headquarters are in Habarosk. If a sister is unsatisfactory in her work or deportment, she is discharged by the medical officer in command and replaced by another. The sisters in the naval hospital, as well as in military hospitals, receive $44 a month, $15 of which is the

regular salary; the rest, $22.50, consists of allowances for rations and $6.50 for a room.

The Japanese bombarded Vladivostok on March 6, 1904. During this bombardment five large shells dropped in the hospital grounds, but fortunately no one was hurt. The patients naturally felt uneasy during the time the shells were dropping near by. Realizing that if Vladivostok were placed in a state of siege, Doctor Rontchevsky conceived the idea of building temporary bombproof wards, where the patients could be placed during active bombardments. With this end in view, he had a series of tunnels dug in the side of the hill. These were not quite completed when the war ended. The floor, sides, and roof of the tunnels were being cemented. Wooden platforms on one side served as temporary resting places for the sick. The tunnels were lighted by electricity and ventilated by three openings and by air shafts at different points. One of these bombproof hospitals was in the grounds of the naval hospital; another was situated across the bay. They were rather damp, but this could have been overcome by a complete cement lining.

During the year 1904, 4,337 patients were treated in this hospital, with 80 deaths. The following embraces some of the cases:

| | | | |
|---|---|---|---|
| Typhoid | 3 | Tuberculosis | 23 |
| Malaria | 14 | Pneumonia | 19 |
| Smallpox | 1 | Insane | 4 |
| Venereal | 499 | Wounded | 151 |

During the same period the following operations were performed:

| | | | |
|---|---|---|---|
| Mastoid operations | 3 | Extirpation of lymphatic glands | 4 |
| Gastrostomy | 1 | Resection of ribs | 7 |
| Extirpation of testicle | 5 | Haematoma | 2 |
| Extirpation of tumors | 27 | Curettement | 1 |
| Cranial osteotomy | 1 | Eye operations | 166 |
| Tonsillectomy | 2 | Herniotomies | 8 |
| Operation of varicose veins | 5 | Laparotomies | 4 |
| Operation for periphimosis | 2 | Operation for empyema | 3 |
| Bursotomy | 12 | Forceps delivery | 1 |
| Amputation of finger | 16 | Amputation of lower extremity | 5 |
| Removal of foreign bodies | 21 | Amputation of upper extremity | 2 |
| Arthrotomies | 5 | Removal of stone in bladder | 1 |
| Resection of mesentery | 2 | | |
| Fistulo in ano | 4 | Total operations | 403 |

The wounded from the *Rossija* and *Gromoboi*, after the battle of the Yellow Sea, August 14, 1904, also the wounded that escaped on the *Almaz*, *Brave*, and *Grosne* from the battle of the Sea of Japan, were also brought to this hospital and treated. A great many of these wounds were of a severe type. They were all inflicted by pieces of shell or splinters, and as a rule took a long time to heal. Amputations were necessary in some cases. The surgeons in this hospital saved tissues wherever they could, and in some cases where a thigh had been practically torn off by fragments of shell they trimmed the parts up, resected the bone, and when the tissues had recovered their vitality covered in the raw surfaces with Tiersch skin grafts.

Some of the cases of shell wounds that had been inflicted four months previously were still unhealed.

In this hospital the surgery was excellent. There were several hernia cases that had been operated upon under cocaine anæsthesia. For varicose veins of the lower extremities the surgeons were perform-

ing a circular incision through the skin down to the fascia about one inch below the tuberosity of the tibia. The skin over the tibia was left intact. The stumps in the cases of amputation were, surgically speaking, all good. The surgeon in chief stated that it was exceedingly rare for a clean case to become infected during any operative procedure in this hospital.

### SHIP CONDITIONS DURING BATTLE.

Among the ships in the harbor at Vladivostok that saw service during the war were the *Rossija, Gromoboi,* and the *Almaz,* which was a little larger and somewhat similar in construction to our *Mayflower. Brave,* and *Grosne* were two torpedo-boat destroyers that escaped from Admiral Togo.

The *Gromoboi* is a beautiful large protected cruiser. Her complement is 1,000 men, and displacement 12,300 tons. The medical complement consisted of 2 doctors, 3 feldshers, one of which was an apothecary feldsher, and 10 sanitats.

The sick bay is situated on the port side of the berth deck, forward; is large and airy, contains 10 iron bedsteads and 2 folding bunks. Adjoining the sick bay is a room containing a closet and large porcelain bathtub. The pharmacy is forward of the sick bay, and is well stocked with drugs which are kept in glass bottles. Drugs are renewed on approved requisitions from storehouses or bought in any quantity recommended by the medical officer. The storeroom was full of gauze, cotton, and bandages.

There is a special operating room on the starboard side of the ship opposite the sick bay. It is fitted up with a modern iron operating table and furniture; two sterilizers, a large cylindrical one which was heated by steam or electricity is used to sterilize dressings, sheets, gowns, etc., and a smaller one, which is worked by steam, was in use for the instruments.

The instruments supplied to the ships consist of a general operating and a dental case. No special eye, ear, throat, and nose cases are allowed. With the instruments on board, however, almost any ordinary operation can be performed.

On this ship a feldsher and 1 sanitat accompany landing parties. Medical officers do not go.

During an action 3 dressing stations were established, 1 aft on the gun deck, in charge of a feldsher, the second forward in the operating room, and the main dressing station, in which both doctors were stationed, was situated on the berth deck amidships in a large washroom. This place was protected on either side by coal bunkers. The presence of plenty of water made it easy to wash off dirt and dress the wounded as they were brought in.

In each casemate with 8 men there were, during an action, placed three pieces of rubber tubing for checking hemorrhages from the extremities, and six packages of sterile dressings that had been prepared on board. These packets contained a piece of cotton 6 by 4 by 1 inch, covered on both sides with gauze, and a 3-inch gauze bandage. In addition to these, small first-aid packets similar to those of the army were distributed about the ship.

The gauze in the small packets was not sufficient to dress the large shell wounds, even temporarily.

For transporting the wounded to the dressing stations the regular Russian naval stretcher, which is a clumsy affair, consisting of three sections which slide into position, was found of little value. On this ship wounded men were simply picked up by men detailed for this duty and carried below. Many times no attempt was made to apply a dressing until the man was turned over to the doctor.

In the fight on August 14, 1904, there were 300 men wounded and 70 killed in action. Of the wounded 21 died later, making the total deaths 91.

The ship was struck by a number of large shells and the superstructure was riddled with holes. One 6-inch gun's crew on the spar deck were all killed by the explosion of a Japanese shell. The shell wounds were as a rule severe. Men were mangled and torn by the splinters as well as by the large flying pieces of shells. Some of the killed presented horrible sights; bodies were almost torn in half; heads were crushed beyond recognition, and blood flowed over everything. The dead were thrown overboard during the action. This was found necessary because of the demoralizing effect on the men produced by the mangled bodies lying on the decks. When so many wounds are to be attended to it is folly to encumber not only the stretcher bearers but also the fighting personnel of the ship with the dead.

A dead sailor during a sharp action is but an incumbrance, and the sooner he is disposed of the better. It is one of the grim actualities of war.

The wounded were carried down to the berth deck and placed on shelves abreast the wash and engine room hatch. These shelves were used by the men for stowing their ditty boxes. The wounded were protected here by the iron side of the ship, 2 meters of coal, and the inner plate of the coal bunker. Several shells penetrated the side of the ship, exploded in the coal, but did no further damage.

The Japanese shells exploded on contact, and coal acted as an excellent barrier to the further progress of the fragments. This fact was demonstrated time and again.

Russian officers have great faith in the protective power of coal, not only against shells, but also against mines and torpedoes.

Most of the men were wounded on the spar deck. If the captain had ordered the men not actually engaged to keep below during the long-distance fighting, there would have been fewer wounded. On the *Rossija*, a sister ship, this was done. When the fighting was at a range where the smaller guns could not be used, these guns' crews were kept below out of danger, and consequently were not unnecessarily exposed.

The *Rossija* is a sister ship of the *Gromoboi* and has the same complement. The medical personnel was the same as that of the *Gromoboi*, as was also the sick bay, pharmacy, operating room, and arrangement of dressing stations during action. Sanitats were distributed about the decks with haversacks containing first-aid packages and tourniquets.

During the fight of August 14, 1904, 150 men were wounded and 57 killed. The *Rossija* was hit really more than the *Gromoboi*, but suffered less in wounded and killed, as has been stated before, because men were not exposed any more than was necessary.

On the *Rossija* the killed and fragments of bodies were thrown overboard immediately, and, in the opinion of the officers, it was the only

practical method of disposal of the dead while active fighting was going on.

The shell wounds were of the same character as those on the *Gromoboi*. The flying fragments of shell twisted and turned through the human tissues, fracturing bones in their course, and often carried pieces of clothes into the wounds. Most of the head and trunk cases proved fatal. The whole ship was covered with flesh and blood, and despite frequent washings and disinfections by formalin the stench of decomposing tissues remained on board for two months. Shortly after the fight it was almost unbearable.

There were 6 wounded men burned to death by the ignition of gunpowder and paint started by the explosion of a shell on the forward gun deck.

The fumes from bursting Shimose shells in closed compartments had the effect of making the men exposed weak and nauseated, and causing a sensation of asphyxiation without a loss of consciousness. Some of these men recovered quickly; others took days before all symptoms had disappeared.

Many of the sailors found small pieces of Shimose shells had penetrated their skin without further damage.

On the *Rossija* the doctors had constructed 20 simple short canvas stretchers, with short wooden side supports. These stretchers were provided with two bands of canvas, one serving as a chest and the other as a hip support. Men with no special duty, such as mess attendants, members of the band, etc., were detailed as bearers. These stretchers were found very practical. Being short and collapsible they could be passed up and down hatches. The chest and hip bands served to hold the man being transported in place.

The Russian sailors are provided with mattresses filled with fine pieces of cork. Canvas bands were sewn on these mattresses in such a manner that a man can slip one of them on his back and be in possession of an excellent life-preserver. Many Russian sailors owe their lives to these mattresses. On several of the Russian ships these mattresses were placed about the spar decks out of the way before an engagement. They also make a fair stretcher. A wounded man can be placed on one of these and slid along the deck to a place where he will not be in the way.

During the battle of the Yellow Sea the badly wounded were carried down to the principal dressing station and placed in the alleyways. They could not be placed on the shelves, as they were in the *Gromoboi*, for the shelves were divided up into small compartments. At this dressing station permanent dressings were applied, fractured members splinted, and such necessary procedures taken to stop hemorrhage as were demanded. It was found that the shell wounds, as a rule, bled very little, and tourniquets were rarely needed to control the hemorrhage.

After the first engagement the Russians had with the Japanese it was seen that the guns' crews on the spar and gun decks needed more protection. It was seen that the Japanese shells burst on contact, and what was needed was some means to catch the fragments after the shell exploded. So, following out this idea, a strong bulwark made of woven steel hawsers was placed transversely across the gun deck well forward. This was intended to stop any fragments of shell that entered the ship through the bow. The same style of bulwark was placed

longitudinally between the starboard and port batteries wherever there was an open space between the guns, so a shell might explode on the starboard side of the gun deck without doing any damage to the men on the port side.

On the spar deck the guns' crews were protected by wire hawsers fitted about the shields of the guns, so as to make practically a small turret. Other guns' crews were protected by sand bags. A large wire mesh net was secured to the underparts of the superstructure in a semicircular form back of the guns. This net was dropped to the deck and used as a support for the sand bags which were placed in position upon it. The sand bags could be removed and the wire nets raised and secured as desired. The idea was to protect men at the guns from fragments of shell that might come from any direction.

The decks of the ships during an action were sanded and kept wet with running water.

One shell fired by the Japanese entered the forward mast and fell down into a compartment below the protective deck, in which were situated the dynamos and open ammunition hoists to the forward magazines. Fortunately the shell did not explode.

The *Almaz* is a large converted yacht on which a number of guns had been placed, transforming the ship into a small, unprotected cruiser. She was the only ship, besides two torpedo destroyers, that passed through the Japanese lines to Vladivostok after the battle of the Sea of Japan. She carried a crew of 300. Her medical complement was 1 doctor, 1 feldsher, and 3 sanitats.

The sick bay is situated on the port side of the berth deck forward. It is large, airy, and well ventilated by a forced supply air system. The deck is covered with linoleum, and 7 iron bedsteads are used for treating the sick. A water-closet and bath are situated in a room adjoining the sick bay. The pharmacy is forward of the sick bay, and contains all necessary drugs. A medical storeroom contained extra quantities of the common drugs, also large quantities of surgical dressings, sterile rolls of gauze, cotton, and sterile gauze bandages done up in paper.

A very nice operating room is fitted up on the starboard side of the berth deck forward. This room is 12 by 14 feet, contains a modern iron operating table and two sterilizers, one small steam one for the instruments, the other of which is for sterilizing the dressings, etc., was a Russian make after the system of Doctor Glowetscky. It could be run by the ship's steam or an electric current.

On the *Almaz* were 12 of the regular naval stretchers. The doctor did not like them on account of their clumsiness. During the fighting the doctor established a dressing station in the wardroom aft. His feldsher was stationed in the operating room forward, and the 3 sanitats carried haversacks containing tourniquets, first-aid packets, and dressings, sufficient gauze and cotton to apply 10 dressings.

During the fight of May 27, 1905, the *Almaz* was struck twice by 6-inch shells. The first struck the after mast, exploded, and did no further damage than to carry the upper portion of the mast overboard. The second shot struck the superstructure on the starboard quarter, exploded, and the fragments went forward along the spar deck, killing 5 men outright and wounding 10 others, 2 of whom died subsequently. Of the 5 killed, 1 was struck by a fragment of shell in the head, the other 4 were struck in the body. All had portions of their vertebral

column carried away and were otherwise badly mutilated. Of the 2 men that were wounded and died subsequently, 1 man received an extensive chest wound; this became infected, the wound became gangrenous, and the man died. The other man was wounded in the head, scapula, body, and legs. He suffered severely from shock and infection and died one week after being wounded.

It was necessary to perform 4 amputations, 1 through the knee-joint, the others through the femur. These cases healed without suppuration. In addition to these operations fragments of shell were removed from 4 other cases. One of these fragments was intimately adherent to a piece of an undershirt which it had carried into the wound. These cases also healed without suppuration.

The *Brave* and *Grosne*, the torpedo boats that escaped from the Japanese in the last naval fight, brought to Vladivostok not only their own wounded, but also some wounded from other ships that they had picked up, making in all about 40 cases. For two days these men were without medical attendance other than that given by a feldscher who was on one of the boats. There were no dressings on board, and the wounded men arrived in Vladivostok in a horrible condition. All the wounds were infected.

The *Askold*, a large protected cruiser, escaped from Port Arthur and reached Shanghai, China, in safety. Her medical complement was 2 doctors, 2 feldshers, and 6 sanitats.

The sick bay, pharmacy, and operating room were all well appointed and practically the same as those on the *Gromoboi* and *Rossia*. On this ship, forward of the sick bay, was an isolation room, to which was attached a separate bath and closet. It was intended for treatment of those cases that might develop among the ship's company when it would be advisable to separate them from contact with the rest of the ship's company.

During an action the principal dressing station was established in the torpedo room, which was a large compartment under the protective deck and was entered from the decks above by a hatch. The wounded were lowered down to this compartment in a chair that was manipulated with a block and tackle. The doctors and wounded were perfectly protected here except from mines and torpedoes.

One feldscher was stationed forward on the gun deck, and the other aft on the same deck during general quarters. Men from the band and mess attendants were detailed to carry the wounded. Very little attempt was made to dress wounds before they reached the doctor.

During the fight that ensued, when the *Askold* was making her escape, 65 men were wounded and 15 killed; of the wounded 20 were severe. The character of these wounds was the same as the wounds received by the men on the *Rossia* and *Gromoboi*.

The *Bayan* was a cruiser that was sunk in the harbor of Port Arthur. Doctor Fehrmann, who was the senior of the two surgeons on board, during action established two dressing stations, one in his operating room forward and the second aft in the wardroom. He had 5 light canvas stretchers with bamboo supports constructed and 20 men detailed as stretcher bearers. No attempts were made on this ship to dress the wounded until they were brought to the dressing stations. No case of serious hemorrhage occurred among the wounded while being transported.

All the Russian ships seem to have ample and comfortable pr
sions for the care of their sick. They carry large supplies of surg
materials. The operating room and sterilizers are especially wor
of notice. All first-class ships are furnished a Roentgen-ray appara

## HOSPITAL SHIPS.

At the beginning of the war the Russians had no means by wh
sick and wounded could be transported by sea. This defect
immediately remedied by buying six large passenger ships vary
in size from 5,000 to 12,000 tons and converting them into hosp
ships. Two of these ships were fixed up and run by the Red C
societies. The *Orel*, an 8,000-ton ship, was fitted out and maintai
by the women of France and Russia. Each defrayed half of the t
expenses.

Provision was made in all of these ships for carrying both officers
men. Bunks were fitted up in the large compartments for the m
the officers were treated in the staterooms. An operating ro
dressing room, the pharmacy, a small laboratory, and a Roentgen-
apparatus were installed in each ship. The idea was to convert
ships into independent hospitals. Some were fitted up better t
others, but as all the ships were large and had plenty of room t
served an admirable purpose.

The medical organization in these ships was the same as that
hospital on shore. There was a chief surgeon, and usually 5 o
assistants. The number of sisters, feldschers, and sanitats depen
on the size of the ship and the number of sick that the ship
intended to carry. Merchant officers were employed to run the sh

These ships carried large quantities of drugs and surgical dressi
also they were all supplied with ice machines and cold-storage ro
in which fresh provisions were kept.

The *Mongolia* was one of the hospital ships supported by the
Cross. She is a 5,000-ton passenger ship that was built in Aust
and before the war she was running between Port Arthur and Vl
vostok. When war was declared this ship was in Port Arthur.
medical staff, consisting of a chief doctor and several assistants,
sisters, feldschers, etc., were sent to her with a complete equipm
of instruments, drugs, dressings, etc. In two weeks after work
commenced several wards had been fitted up with metal cots
treating the men. A number of staterooms were set apart for
treatment of officers. In all there were accommodations for 250 m
and 40 officers.

The operating room was established in the smoking room on
spar deck. It was nicely fitted up and supplied with plenty of lig

This ship remained in Port Arthur during the whole siege. In
about 800 cases of injury and sickness were treated on board.
surgeons also performed a large number of operations.

During the different bombardments this ship was struck by sh
on three different occasions, with the result of only one man wound
The ship was kept in sheltered positions as much as possible.

For receiving and transferring patients over the sides of the s
use was made of two large wooden platforms sufficient in size to h
two stretchers. Sides were attached to the platforms, and the wh
was suspended by ropes and swung clear of the ship and lowered

means of two small cranes worked by steam winches. The doctor stated that this arrangement worked very well in quiet water, but they had had no experience with it when the sea was rough.

The *Nostrome*, a 7,000-ton ship, was bought from the North-German Lloyd Steamship Company and transformed into a hospital ship at Shanghai.

The ship was completely refitted; wards for men were fitted up with metal cots in the cargo spaces, so that in all about 700 patients could be accommodated.

Staterooms were set apart for the treatment of sick officers. The poop deck aft was used for convalescent officers, and the flying deck amidships was set apart for the use of convalescent men. The after saloon was utilized as a dining room for the men.

An elaborately appointed operating room, containing three operating tables, was situated on the second deck on the starboard side. The floor was tiled; waterways ran around the sides so the floor could be flushed out by a hose, the water being carried over the side of the ship by a chute. Light was provided by a large skylight and by windows that had been cut in the ship's side and electric lights.

The sides, floor, and ceiling of the operating room were padded with a foot of felt and sawdust, the inside being finished in hard wood. The doors were large and provided with rubber attachments, so that they could be opened and closed noiselessly.

Forward of the operating room was a dressing room, in which were situated three tables for dressing cases. The sterilizers were also in this room.

The surgical ward adjoined the operating and dressing rooms and was elaborately fitted out.

Ventilating hatches and large steam blowers supplied ample ventilation to all parts of the ship.

The galleys were large. Most of the cooking was done by electricity. Large quantities of provisions were kept in a large cold-storage plant, so that it was possible to give the sick plenty of fresh provisions.

The general health of the Russian forces afloat was excellent. The diet, clothing, and sanitary conditions that prevailed on the Russian ships compared favorably with those of the ships of our own Navy.

The lack of success of the Russians on the sea can not in any way be accounted for by the physical condition of the individual crews.

## CONCLUSION.

The Russians and the Japanese each had a formidable camp disease to contend with. The Russians brought typhoid fever to their camps, and although a number of cases developed the whole army would have been prostrated and rendered useless by the disease if sanitary measures had not been taken to check the disease and prevent its spread. On the other hand, the Japanese brought with them beriberi, a disease with about the same death rate as typhoid fever and a disease which incapacitates its victims absolutely for the performance of any military duties for months. We know more about the cause of typhoid fever and the modes in which the disease is disseminated than we do of beriberi, but we also know that of the two diseases beriberi is the easier to combat and eradicate by means of diet and proper sanitary measures. So the large number of cases of beriberi that developed in

the Japanese army rather points to the fact that as hygienists th Japanese were not superior to the Russians.

Doctor Herzog, of the bureau of government laboratories, of Manila P. I., who was detailed to study beriberi in the Japanese army, state in his report that between 75,000 and 80,000 cases of this disease were sent back to Japan from Manchuria during the last year of the war. There were in addition to these cases a number of severe ones that died in Manchuria. In other words, many thousand cases of a preventable disease developed in an army supplied with medical men that are considered good hygienists. These cases developed in the same territory that had been occupied by the Russian forces.

The Japanese, either on account of a natural immunity, diet, or because many of them had already had this disease when young, exclusive of sanitary measures, did not suffer to the extent their opponents did from typhoid fever, but nevertheless a number of cases of this disease did develop among their army.

In the Russian army no cases of beriberi developed, but 17,033 cases of typhoid fever, a preventable disease, did occur; but this total number of typhoid cases during the whole war is but one-fifth of the total number of cases of the principal preventable disease of the Japanese camps (beriberi) that occurred during the last year of the war. The total number of cases of beriberi that occurred in the Japanese army during the whole war will probably never be known by the public. So it is safe to conclude that the Japanese forces lost the services of many more men through preventable camp diseases than did the Russians.

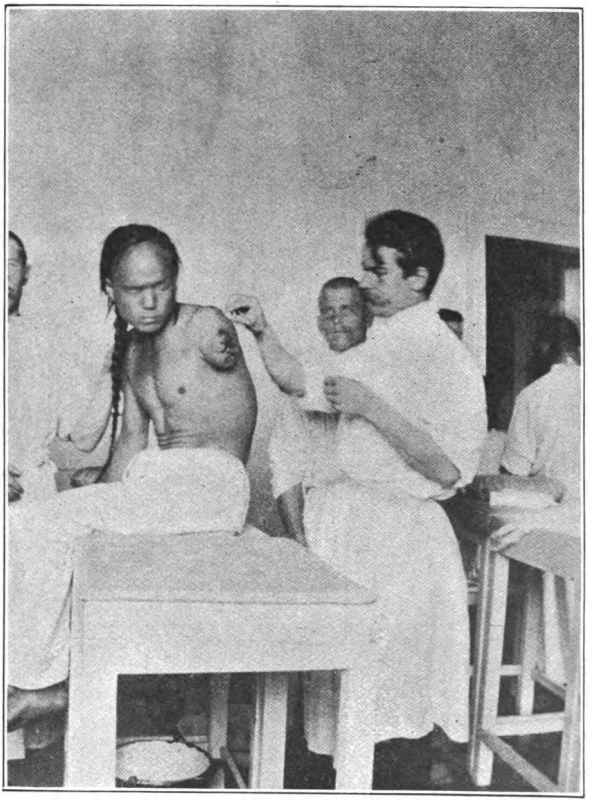
For safeguarding the health of the largest army ever gathered together in the world's history, through sanitary and military hygienic measures, and for keeping it comparatively free from the many diseases that always threaten large assembled bodies of men, Russia must thank her medical men, for, though they were often hampered by the lack of authority, they showed that they were equal to the medical problems that constantly presented themselves and were practical to a degree in the performance of their duties.

Very respectfully,

RAYMOND SPEAR,
*Surgeon, U. S. Navy.*

The SURGEON-GENERAL.

O



AMPUTATION SHOULDER JOINT.